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Dynamics of Human Development:
ACHIEVEMENT CRISIS

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INTRODUCTION

It is not unusual to hear stories of successful people who, at the peak of their careers, discover a deep dissatisfaction with their lives, undergo a "crisis," and depart from the path they have so eagerly pursued. The executive with brilliant record of accomplishments who decides to give up his career and begin anew, the student or academician, with the most desirable scholastic achievements, who do not find a lasting satisfaction and decide to abandon what they have pursued for so long, are but few examples of this "achievement crisis" syndrome.

Crises such as these are not universal. There are those who "make it" and who continue "making it." There are successful people that never undergo such crises. They are able to find satisfaction in their accomplishments. Such people seem to achieve a "peace of mind" that is immune to environmental disturbances; a state that leaves little room for emotional crisis.

This paper seeks to examine some of the major environmental and personal characteristics that combine to generate such crises, and the resources that can mitigate them. In the following sections, first the achievement crisis syndrome is defined. Next, a hypothesis that seeks to explain its generation is developed. The hypothesis is then formalized into a mathematical model. Finally, model simulations are used to gain a better understanding of the crisis and the personal characteristics that can prevent it.

I. THE ACHIEVEMENT CRISIS

The term crisis, as used in this paper, refers to a major abrupt transition in the way an individual thinks and behaves. Crises result when a reappraisal of a given mode of existence leads the individual to adopt a new mode. Crises represent the culmination of a continuous process, even though in some instances they appear to be triggered by a particular event. A crisis period is often painful, dissatisfying, and depressing. However, if the individual can survive the associated emotional paralysis, once the crisis is resolved, a happier and more stable life can be pursued.

An individual might go through a number of different transitions or crises in life. Erikson (1950) has identified eight such transitions, each of which he associates with a developmental stage primarily in pre-adulthood. Others (Levinson, Neugarten, Brim, Lowenthal, Jacques) have studied mid-life crises; crises that occur roughly between the ages of 35 and 45 for the majority of individuals. Brim (1976) has conducted a thorough survey of "theories of the male mid-life crisis," and summarizes the causes set forth for transitions as: social status and role changes, biological changes, confrontations with death, stagnation vs. "generativity," aspiration-achievement gap, relationships within the family, and the resurgence of "the dream."

Social status and role changes, such as completing school and starting a career, marriage and the birth of the first child, departure of children from home, and retirement from the workforce are all events that occur in nearly everyone's life. These changes, as well as physiological aging and the encounter with death, are all predictable and inevitable events. They might precipitate or intensify a more fundamental

crisis, but they cannot be considered as a primary cause of a major crisis.

Stagnation vs. "generativity," one of Erikson's eight stages of development, "...may describe the possible resolutions of mid-life crisis rather than its cause" (Brim 1976). It can result in a crisis to the extent that "stagnation," or the individual's failure to shift his life interest and concern to the development and achievements of the younger generation, can create depression and lead to attempts to avoid this through devoting one's life and attention to the training and comfort of the young, i.e., "generativity."

Aspiration-achievement gap and the relationship within the family both have to do with the downward readjustments of dreams toward hard reality. The individual, at some stage, comes to realize that there are limits to his capabilities and that he cannot achieve all that he has aspired, nor can he mold his children to fit the ideal family model. Even if the individual succeeds in achieving what he aspires to, his success might not lead to happiness and the chances for a more major crisis might remain.

"A man may do extremely well in achieving his goals and yet find his success hollow or bittersweet. If, after failing in an important aspect, he comes primarily to castigate himself for not being able to "make it," then he is having a rough time but he is not having a mid-life crisis. he just regrets failure." (Levinson et al. 1976).

This brings us to the final suggested cause for a mid-life crisis; resurgence of "the dream."

"Levinson and his colleagues most clearly set forth the view that maturation requires one to go through a period of suppression of certain aspects of the self in order to develop and commit to a given life structure, involving an occupation and a family, and that during middle age the suppressed aspects of the self push toward the surface and demand that the man reappraise who he is and what he has been doing. They use

the concept of 'the dream' as a youthful aspiration, or an early image of the future self that never dies" (Brim 1976).

"The central issue [in a mid-life crisis] is not whether the individual succeeds or fails in achieving his goal.... It is not a matter of how many rewards he has obtained; it is a matter of the goodness of fit between the life structure and the self.... [The individual] is having a crisis to the extent that he questions his life structure and feels the stirring of powerful forces within himself that lead him to modify or drastically to change the structure" (Levinson et al. 1976).

This concept of crisis is what Gail Sheehy (1976) calls the "authenticity crisis," and what I call the "achievement crisis." A crisis in which the source of dissatisfaction is primarily the disparity between what the individual has accomplished to please his family, friends, superiors, and society (i.e., externally motivated accomplishment), and what he genuinely has undertaken out of his inner desires (i.e., self-motivated accomplishments).¹ Transition away from the crisis and the resolution of it, in Sheehy's words, involve a move through a disassembly to a renewal; disassembly of a narrow self, tailored to please the culture and other people, and a renewal in which the "real self" is allowed to flourish, "a move away from the institutional claims and other people's agenda. Away from external valuation and accreditation, in search of an inner validation."

¹The distinction between externally motivated accomplishment and self-motivated accomplishment might not be clear in all instances. Many of the activities that please others and are rewarded by society might be undertaken out of an individual's genuine inner desire. Such activities can be considered contributors to both externally motivated and self-motivated accomplishment.

II. HYPOTHESIS

The dissatisfaction that leads to an "achievement crisis" develops when individuals recognize a "failure" to accomplish their inner desires. They might be "successful" in achieving what their parents, friends, supervisors, and/or culture wanted them to accomplish. However, they are "failures" to themselves because they have not engaged in enough activities that were self-motivated; i.e., originated from within.

What, then, leads individuals to comply with the desires which others hold for them, while suppressing their own inner drives? What leads individuals to pursue "externally motivated" desires, succeed in them, and therefore postpone the pursuit of "self-motivated" desires to the point where an "achievement crisis" is developed? The hypothesized answer is that the individual's need posture from life's early phases (i.e., need for food, shelter, clothing, attention, caring, etc.), along with the continuous new needs and demands generated by his surroundings, prevent him from becoming sufficiently involved in self-motivated activities. Instead, he comes to devote more of his capabilities to actions that are appreciated, recognized, and rewarded by his immediate environment. Through expertise that he develops in working and living for others, and through dependencies that he creates in the process, the individual becomes entrapped in a vicious circle in which efforts to gain recognition and reward lead to accomplishments that are externally motivated. Such accomplishments lead to experiences that ease future accomplishments and also add to the dependencies that force the individual to look for more rewards and donate more attention to externally motivated activities. As the individual become more occupied with externally motivated activities, through the above-mentioned vicious circle, the dis-

parity between what he achieves for others and what he achieves for his inner self grows. Recognition of such a disparity results in dissatisfaction which, if suppressed, can lead to even more disparity and still greater dissatisfaction and depression.

It is true that the individual in the early phases of life is more inclined to pursue what the inner self dictates. However, it is equally true that he is surrounded by a social system in which the satisfaction of many of his basic needs is dependent upon others. The individual becomes involved in social patterns in which his performance is rewarded by providing the means that satisfy his basic needs. As the individual, for the satisfaction of his basic needs, assumes an "outward-looking" orientation, he starts to allocate more of his capabilities to the activities that are most rewarded by others. This allocation scheme provides the individual with the experience and the expertise that ensures future successes in that area. The experience, however, is not free. The time and the effort put into these socially rewarded activities prevent the individual from developing the capabilities and the experience necessary for dealing with the self-motivated and inner-driven activities.

Apart from the "dislocation" of experience, there are other influences that keep the individual from the pursuit of his inner desired. His preoccupation with basic needs impedes the satisfaction of higher order needs.² In particular, he does not pay significant atten-

²Maslow (1954) believes in a hierarchy of needs that starts with man's physiological needs and ends with a need for self-actualization:

1. physiological needs: need for food, shelter, sex, sleep, activity and exercise, sensory pleasures, etc.
(continued)

tion to the development of need autonomy and need self-actualization.

(Maslow 1954) The low degree of self-actualization in turn expands the domain of his dependencies. He places more emphasis on socially generated basic needs. He tends to recognize more of such needs and tends to

-
- 2. safety needs: need for protection against danger, threat, deprivation; need for stability, dependency, structure, order, law, etc.
 - 3. social needs: need for belonging, association, acceptance by one's fellows, giving and receiving friendship and love.
 (belonging/love needs)
 - 4. esteem needs
 (a) those related to reputation or respect from others:
 need for status, recognition, attention, appreciation, and for the deserved respect of one's fellows.
 (b) those related to one's self-esteem:
 need for self-confidence, independence, freedom, achievement, competence, knowledge.
 - 5. need for self-actualization
 need for realizing one's own potentialities, for continued self-development, for being creative in the broadest sense of that term; need to become everything that one is capable of becoming.

Maslow believes that a precondition for the satisfaction of higher-order needs is the satisfaction of physiological needs, safety needs, etc. "Unless the circumstances are unusual, [man's] needs for love, for status, for recognition, are inoperative when his stomach has been empty for awhile. But when he eats regularly and adequately, hunger ceases to be an important need."

In this paper Maslow's hierarchy of needs is broken into two broad categories. Physiological needs, safety needs, social needs, and the esteem need, related to respect from others, are grouped under the broad label of the "unsatisfied basic needs." Such needs, for the most part, should be satisfied through contact with other people and through rewards received from them. Those of the individual's needs that are related to his self-esteem, autonomy, and self-actualization are grouped under the "degree of self-actualization." Such needs are basically satisfied through the self-motivated activities of the individual. Although the satisfaction of the "unsatisfied basic needs" facilitates a movement toward self-actualization, satisfaction of high-order needs, in moderate amounts, is possible even if not all the basic needs are satisfied.

place more value on social rewards that can satisfy them. Such a state of affairs makes the individual more involved with socially rewarding activities which, in turn, weakens his commitment to self-motivated activities. The individual remains entrapped in this game to the point where a huge disparity between accomplishments that the individual can recognize as self-motivated and those that are mainly undertaken for rewards from others is developed. The widening of the gap between these two sets of accomplishment, and the realization of the fact that the individual has not achieved what he personally desires, creates a deep dissatisfaction which can eventually lead to a crisis. Depending on the individual, this can result in a dramatic breakdown or it can result in a severe change in the individual's lifestyle, career, or activities.

In the next section, the elements involved in generating the above hypothesis are defined, and the interrelationships between these elements made explicit.

III. FORCES AFFECTING THE CRISIS

The following section examines, in a qualitative manner, some of the major forces that contribute to the development of the achievement crisis. The descriptive model of this section and the interrelationships between different elements are quantified in a simulation model. The model uses System Dynamics methodology,³ and is the basis for the generation of results in the next sections. Details of this model are included in the appendix. The following description, however, should be sufficient for the understanding of the hypothesized causes of the crisis, and the results presented in the concluding section of this paper.

Accomplishment

As already described, a major cause of the "achievement crisis" is hypothesized to be the disparity between the individual's externally motivated and self-motivated accomplishment. Each category of accomplishment is motivated by different elements, and each has different effects on the variables of importance to the individual. For these reasons, these two categories of accomplishments will be differentiated and discussed separately.

A. Externally-Motivated Accomplishment:

Included under this category are accomplishments of tasks assigned to the individual by others. Such accomplishments are motivated by rewards from others. Involvement in work motivated by salary, studies motivated by grades, and social behavior motivated by accept-

³Readers interested in the System Dynamics methodology should consult references 2 and 4.

ability all fall into this category.

The desire to engage in such activities is hypothesized to depend on three components: perceived duty, value of the reward, and the likelihood of such reward (Figure III-1).

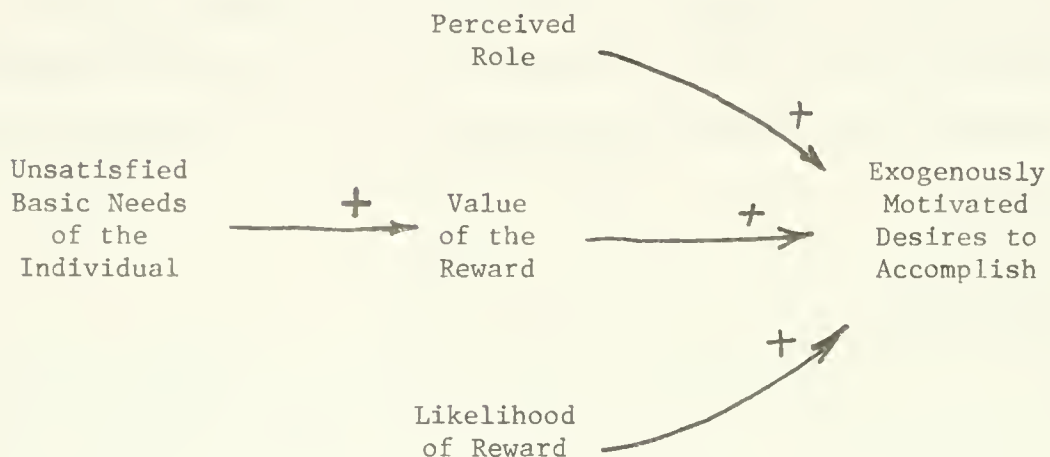


Figure III-1.
FORCES GIVING RISE TO THE DESIRE TO ACCOMPLISH FOR OTHERS

Each of these three variables has a positive influence on the externally motivated desires to accomplish.⁴ Perceived duty is what the individual believes he should accomplish. It is, as will be shown later, based on social expectations and the degree of sensitivity of the

⁴The symbols in Figure III-1 and the causal loop diagrams presented in this section require some explanation. A line between two variables is an indication of a direct relation between the two. The arrow shows the assumed direction of causality, and the plus or minus signs show whether the two variables move in the same or opposite directions, respectively.

individual to such expectations. Value of the reward is the value that the individual places on any reward he anticipates receiving for the accomplishment of tasks assigned to him by others. If a reward (say, receiving attention) is very valuable to an individual, his desire to accomplish the task that ensures such a reward is definitely increased. The value placed on a reward is in turn determined by the unsatisfied basic needs of the individual (Figure III-1). An individual with more unsatisfied basic needs, other things equal, will place a higher value on rewards from others. Once these needs become satisfied, the value of the reward diminishes.

The final influence, on externally motivated desires to accomplish, is the likelihood of reward. If the individual is sure of receiving a reward he might desire to accomplish more. On the other hand, when the individual perceives that there is no likelihood of being rewarded, his desired for further accomplishment decline.⁵

The desire to accomplish, in Figure III-1 does not guarantee a realization of these desires. As shown in Figure III-2, an individual can only achieve if he sufficiently commits himself to the accomplishment of his objectives. The extent to which the individual's constant natural capabilities are committed to externally motivated activities depends on the degree of unrealized desires for such activities. Whenever desires for externally motivated accomplishment are above the actual value of such accomplishment, the individual tends to commit more of his natural capabilities to externally motivated activities. Once the individual commits himself, he can generate new accomplishment. These

⁵Effect of the likelihood as well as the value of reward on performance of the individual is recognized and more thoroughly discussed by Porter and Lawler in their book on management attitude and performance.

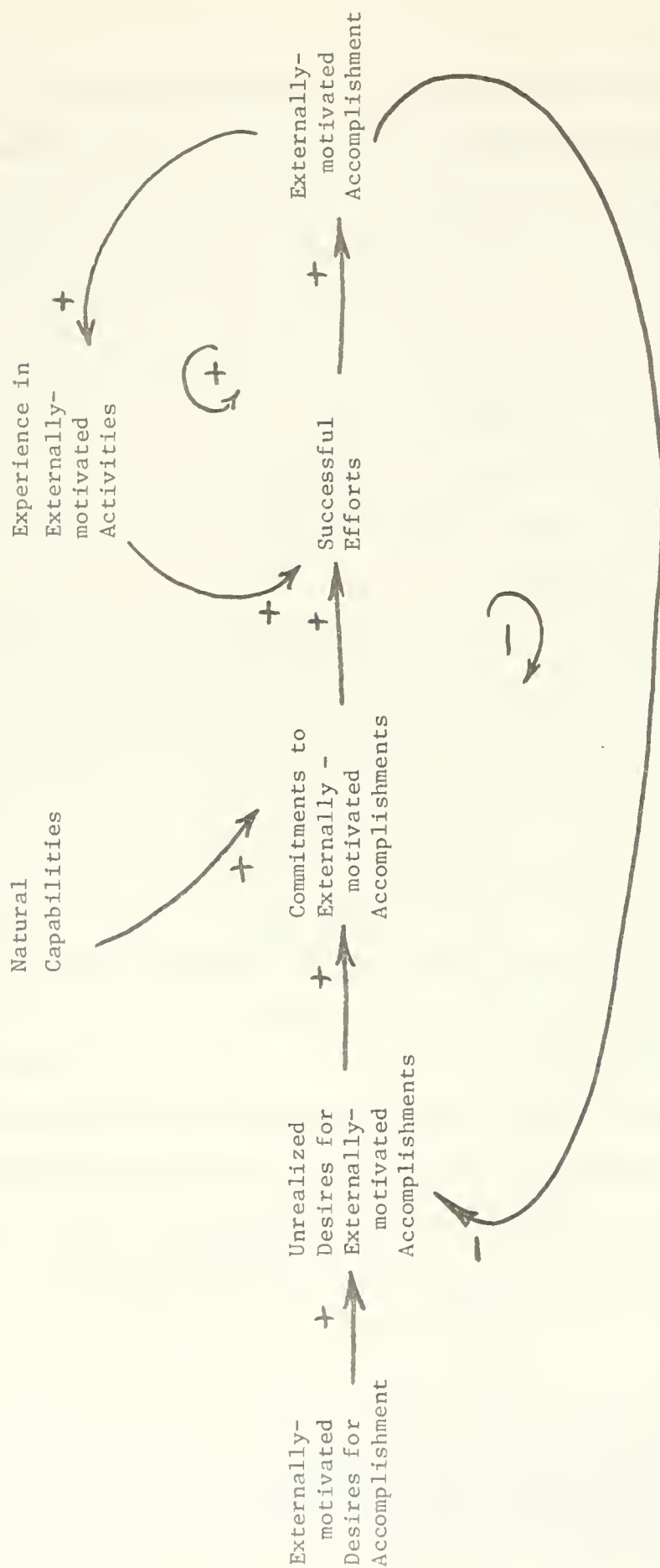


Figure III-2: Determinants of Externally-motivated Accomplishments

accomplishments are, of course, facilitated by the individual's past experience with accomplishment of similar tasks. As can be observed from the figure, the individual's experience in achieving tasks assigned to him by others is embodied in a positive feedback loop;⁶ a rise in experience, other things equal, gives rise to successful efforts and more achievements, which, in turn, adds to the individual's experience. Thus, through experience, the greater the individual's externally motivated accomplishment, the easier are his future accomplishment.

Although this positive feedback loop produces a growth tendency in externally motivated activities, there is a negative loop that tends to limit this growth. As can be seen in Figure III-2, for a given amount of externally motivated desire for accomplishment, any rise in accomplishment reduces the amount of unrealized desire for externally motivated activities. This reduces the individual's commitment and hence results in a reduction of new successful efforts, thus limiting externally motivated accomplishment. The loop just described is a goal-seeking loop that tries to match the externally motivated accomplishments of the individual to his desires for such accomplishments.

We can now expand the causal loop diagrams of Figures III-1 and III-2 to include the links between an externally motivated individual and his surrounding individuals. Such links are established through rewards and expectations.

A successful effort in the accomplishment of something of

⁶A closed loop is considered to be positive when an increase [decrease] in one variable creates changes in other variables within the loop, in such a way that it eventually results in further increases [decreases] in the original variable. While a positive feedback loop has a tendency to enforce the original change, a negative feedback loop has an inverse effect and tends to compensate for any change.

value to society is assumed to be rewarded by society (Figure III-3). Rewards can be financial, or they can be professional recognition, offers of friendship, or love, etc. Any reward is assumed to contribute to the satisfaction of one of the individual's basic needs. For example, a financial reward can provide the individual with the means for satisfying his physiological or safety needs. A social reward, manifested in a gesture of recognition or an offer of friendship, can satisfy some of the individual's social needs.

As shown in Figure III-3, several new feedback loops are introduced through rewards. Any autonomous rise in rewards reduces some of the unsatisfied basic needs of the individual, and thus reduces the value he places on any future rewards. As the value of a reward is lowered, the individual's externally motivated desires for accomplishment is reduced. This in turn reduces the amount of unrealized desires and leads to a reduction of commitment to externally motivated activities. Finally, any reduction in commitments generates less successful effort and thus results in a reduction of rewards received by the individual. This native, or goal-seeking, loop, in which any autonomous rise in rewards lowers the needs of the individual and thus results in less commitment and less accomplishment, tries to limit the dependency of the individual on external motives; an individual with high unsatisfied basic needs is motivated to work for society only to generate enough rewards to satisfy his basic needs. Once these basic needs are satisfied, future rewards lose their value to the individual's eye, and thus he loses interest in externally motivated activities.

For an outward-looking individual, however, there are other mechanisms that tend to expand his dependencies on external sources of motivation. As can be seen from the positive feedback loop of Figure

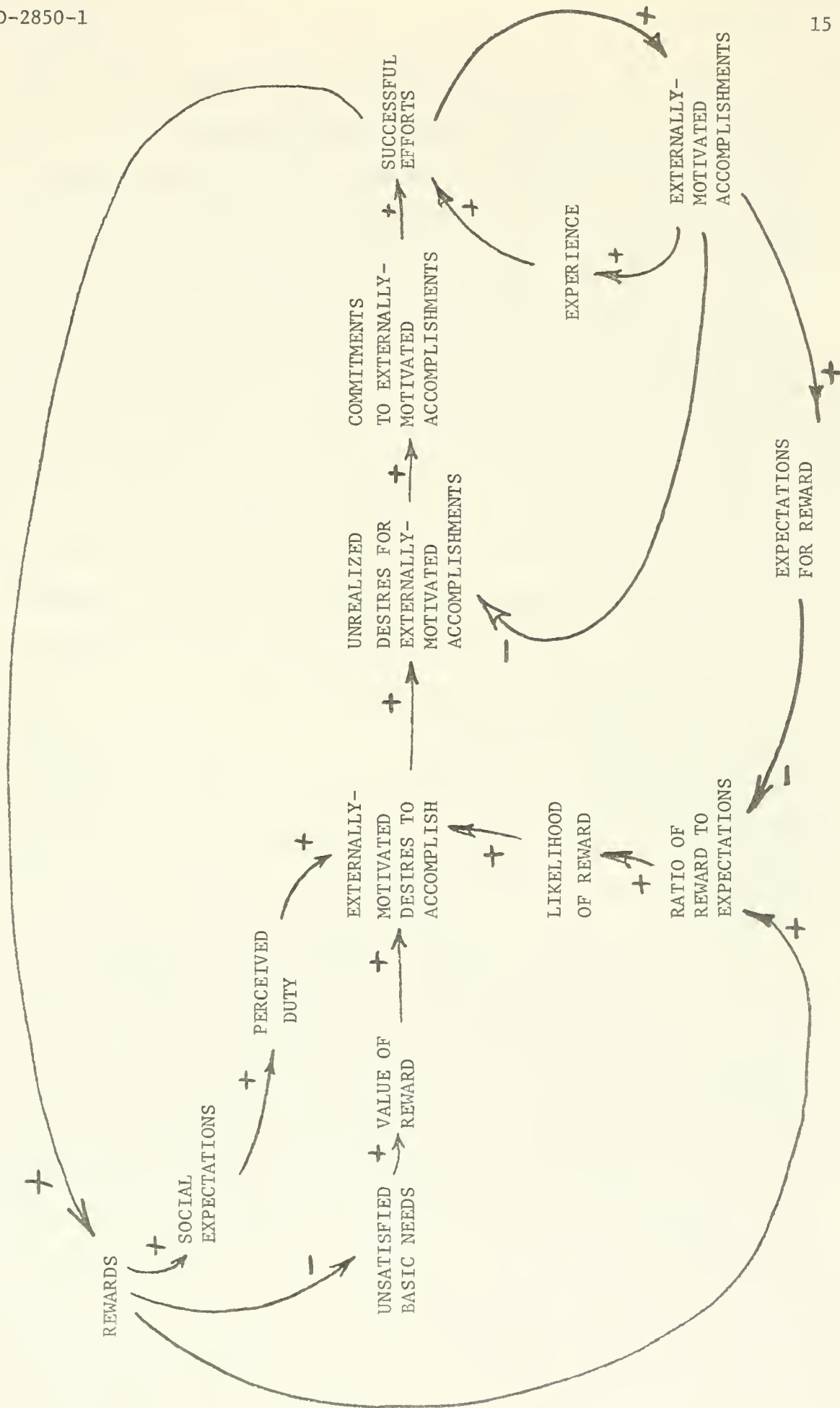


FIGURE III-3: EFFECT OF REWARD ON EXTERNALLY MOTIVATED ACCOMPLISHMENT

III-3, a rise in rewards increases social expectations. (The person granting the reward expects some new accomplishments in return.) As social expectations rise, the perceived duty, or what the individual believes he should accomplish, increases. This raises the individual's desire to accomplish, which, given the necessary preconditions, can increase his future accomplishments and lead to a new set of rewards. The above positive loop of Figure III-3 is not the only one that reinforces the dependency of the individual on rewards. As rewards increase, the likelihood of future rewards increases, which again gives rise to greater desires to accomplish, more commitment, greater accomplishments, and a new set of rewards. The effect of this latter positive loop, however, is modified through expectations for rewards, embodied in a negative feedback loop. As externally motivated accomplishment increases, the individual's expectations for reward also increases. (This is more so for "outward-looking" individuals.) For any reward administered, the higher the expectations for reward the lower the ratio of reward to expectations and, hence, the lower the likelihood of reward in the individual's eyes. This would mean a reduction in the desires to accomplish and eventually a decrease in accomplishments.

The above negative loop, along with the other negative feedback loop in which the value of reward is embedded, both try to check the desires for externally motivated accomplishment. The other two positive feedback loops (the ones dealing with social expectations and likelihood of reward) are the major entrapment mechanisms for reinforcing the dependency of an "outward-looking" individual on external sources of reward.

B. Self-Motivated Accomplishment:

In contrast to the externally motivated individual, the self-motivated person pursues the set of accomplishments that result from internal motives. The desire for self-motivated accomplishment is independent of the rewards or the expectations of society. Any self-motivated accomplishment brings fulfillment and reduces the high-order needs of the individual and results in a movement towards self-actualization. Reading a book only for the satisfaction it offers, pursuit of a research project without regard for the recognition it may bring, working for the satisfaction that a job can offer rather than for salary, are all examples of self-motivated activities. The essential relationships governing self-motivated accomplishment are depicted in Figure III-4.

Comparing this figure with Figure III-3 shows that, here again, used capabilities, prior experience, and desires are the basic determinants of self-motivated accomplishment. Desires, however, have different determinants. Here the desires to work for oneself rather than others are based on two factors:

- (1) The degree to which the individual is dissatisfied with the "outward-looking" orientation; and
- (2) The degree to which the individual has become self-actualized (i.e., has developed an "inward-looking" orientation).

The distinction between the outward-looking and the inward-looking orientations (or what David Reisman (1950) calls the "other- vs. inner-directedness") is well described by Shostrom (1976):

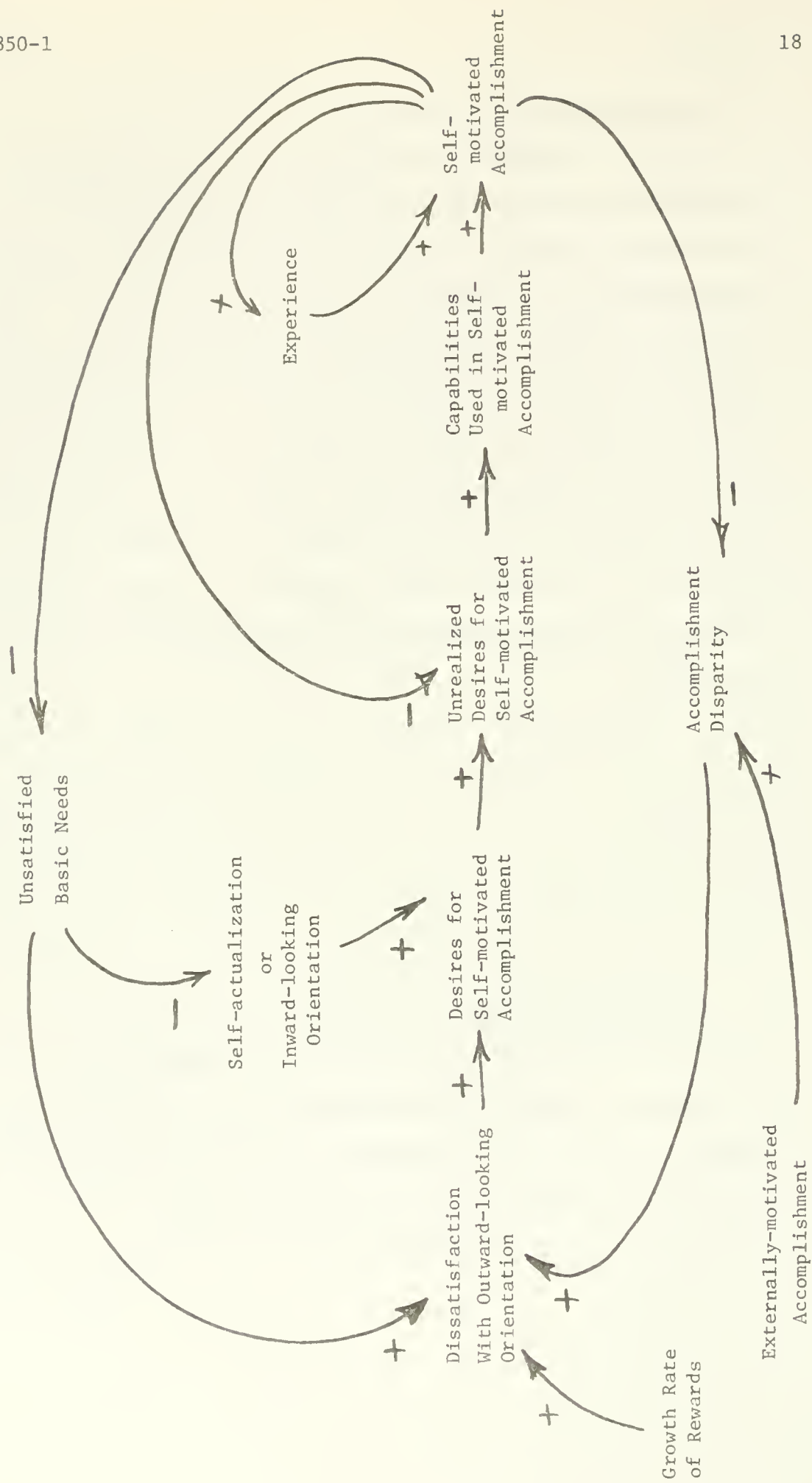


Figure III-4 : Influences on Self-motivated Accomplishment

...the other-directed person is more facade-oriented, whereas the inner-directed person is more core-oriented. For the other-directed person, manipulations such as pleasing others and insuring constant acceptance become the primary method of relating. Dependence on others is characteristic of this stance in life. On the other hand, the inner-directed person is much more independent and appears to have incorporated an "inner gyroscope" and he obeys this internal piloting of himself.

The individual's dissatisfaction with his "outward-looking" orientation stems from three sources. As shown in Figure III-4, the extent to which he has succeeded in accomplishing for others and failed to accomplish for himself (accomplishment disparity), the extent to which his basic needs are unsatisfied, and the sense of decline in the rate at which he has received new rewards from society (growth rate of reward). As the individual becomes aware of the disparity between the accomplishments that he has undertaken to please others and ensuring acceptance, and the ones that have been self-motivated, he finds himself other-directed and as such dissatisfied (Figure III-4). To the extent that the individual feels dissatisfied with his outward-looking orientation, he forms desires for self-motivated accomplishments. The formation of desires will eventually lead to more self-motivated accomplishment, less accomplishment disparity, and hence a fall in the level of dissatisfaction.

As can be seen in Figure III-4, a rise in self-motivated accomplishment also reduces some of the unsatisfied basic needs of the individual; whereas the externally motivated individual works for others and, through rewards, satisfies his basic needs, a self-motivated individual achieves the same, but through autonomous accomplishments. As the unsatisfied basic needs of the individual are reduced (either through autonomous accomplishments or through rewards that he receives from others), his dissatisfaction with an "outward-looking" orientation

is reduced. This should lower the desire for self-motivated accomplishment. But there is another influence on desire for self-motivated accomplishment that compensates for this effect, and that is due to self-actualization; a reduction in the unsatisfied basic needs of the individual means that the individual has achieved the basics in life and can now develop more of an "inward-looking" orientation. This implies a rise in the degree of self-actualization, higher desire for self-motivated accomplishment, and eventually higher self-motivated accomplishment. As Abraham Maslow⁷ states:

[S]ince they are propelled by growth motivation rather than by deficiency motivation, self-actualizing people are not dependent for their main satisfactions on the real world, or other people or culture or means to ends or, in general, on extrinsic satisfactions. Rather, they are dependent for their own development and continued growth on their own potentialities and latent resources. Just as the tree needs sunshine and water and food, so do most people need love, safety, and the other basic need gratifications that can come only from within. But once these external satisfiers are obtained, once these inner deficiencies are satiated by outside satisfiers, the true problem of individual human development begins, e.g., self-actualization.

But satisfying the basic needs alone is not sufficient for a move toward self-actualization. The individual needs to have prior experience with autonomy and self-motivated accomplishment. Thus, the rise in self-motivated accomplishment induces a higher degree of self-actualization, which in turn produces higher desires for self-motivated activities and thus higher self-motivated accomplishment.

Having discussed the determinants of the self- and externally motivated accomplishments in isolation, we can now move to examine the interactions between the two categories of accomplishment and the rise of the "achievement crisis."

⁷Maslow, Motivation and Personality, 1970, p. 162.

Interaction Between Self-Motivated and Externally Motivated Accomplishments

The causal loop diagram of Figures III-3 and III-4 identified the mechanisms through which an individual comes to pursue the externally motivated and the self-motivated activities, respectively. If the natural capabilities of the individual are evenly divided between self-motivated and externally motivated activities, and if the pursuit of each category of accomplishment is equally motivated and reinforced, then one should expect a balanced growth and a life pattern in which no "achievement crisis" is observed.⁸ But over-commitment of the natural capabilities to externally motivated activities, or strong desires for the pursuit of such tasks, produce an imbalance in the achievement patterns of many individuals, and can eventually lead to a crisis.

An important interlink that can determine the extent of desires to pursue either of the two sets of accomplishments is the degree to which an individual has achieved self-actualization. As Shostrom (1976) describes, a self-actualizing person is motivated by

"his core subjective needs what he wants, prefers, likes, and chooses. He is not motivated by the feeling that he is an object of others, that he has to, must, can't, or should. These are familiar facade approaches to life, motivated by others' need for him. His primary energy direction is from the core outward. The actualizing person takes 'response-ability' for himself: he has the ability to respond or make decisions for himself... he trusts his own 'inner Supreme Court.'"

Figure III-5 shows the effect of "degree of self-actualization" on some of the variables that were discussed in previous causal

⁸A balanced growth in this paper implies a growth pattern in which the disparity between the two categories of accomplishment never reaches an appreciable level.

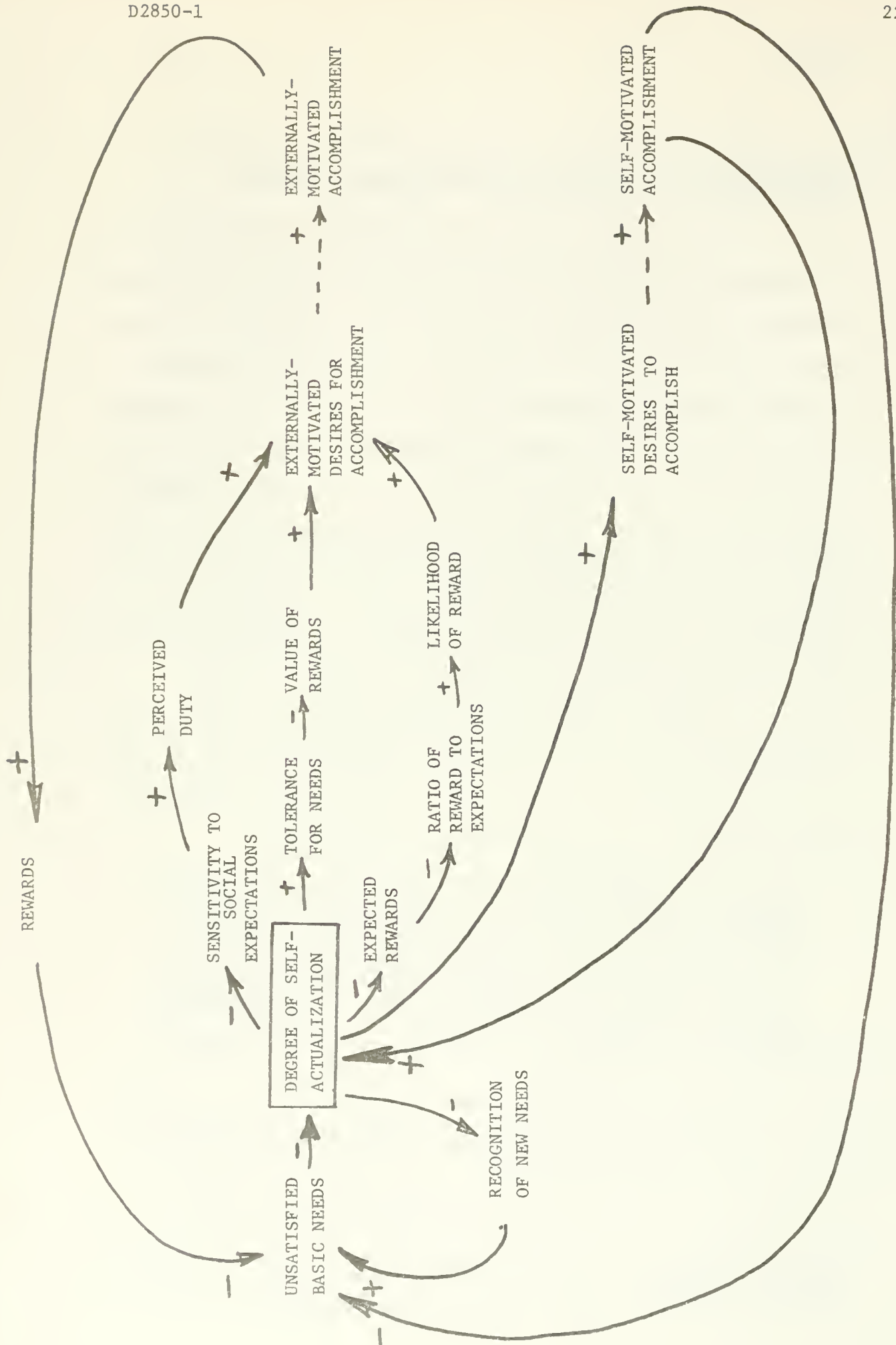


FIGURE III-5 : Self-actualization and Its Effects

loop diagrams. Since the self-actualizing person is motivated by his "core, subjective needs," he has more tolerance for unsatisfied basic needs than other individuals. He recognizes less of the new needs and demands placed on him by the society and he expects less reward for whatever he accomplishes. A self-actualizing person does not have the feeling that he is an object of others. Hence, as shown in Figure III-5, his sensitivity to social expectations is reduced as he achieves more self-actualization. Self-actualizing persons

"assimilate their work into the identity, into the self, i.e., work actually becomes part of the self, part of the individual's definition of himself." (Maslow 1965).

It can safely be assumed, then, that a rise in the degree of self-actualization should result in higher self-motivated desires for accomplishment. A movement towards self-actualization thus weakens the externally motivated desires, and strengthens the self-motivated desires for accomplishment.

In order to accomplish any of his desires, the individual needs to commit his natural capabilities, be they mental or physical, to the accomplishment of such desires. Natural capability is assumed to be constant through life.⁹ This creates a tradeoff between commitments of capabilities to externally motivated tasks and self-motivated ones. As shown in Figure III-6, a rise in commitments to externally motivated activities increases the externally motivated accomplishment. But a rise in commitment to externally motivated activities means a reduction in the capabilities used for self-motivated tasks, and hence a drop in accomplishments of this category. The combined effect of a rise in exter-

⁹The constant natural capability at birth is augmented through experience in accomplishment of different tasks. This was shown in previous causal-loop diagrams.

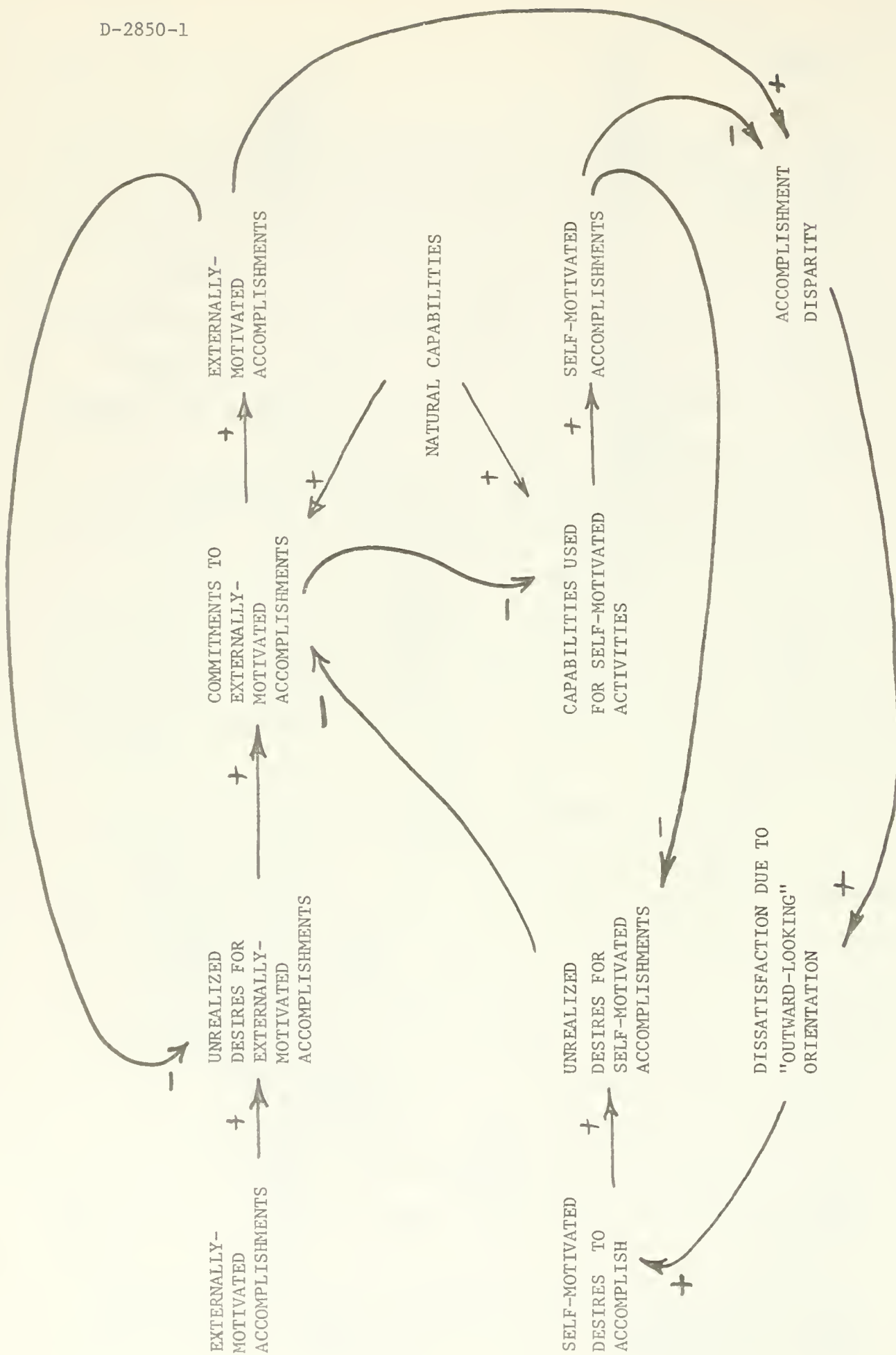


FIGURE III-6 : COMMITMENT OF CAPABILITIES TO THE TWO CATEGORIES OF ACCOMPLISHMENT

nally motivated accomplishment and a fall in self-motivated accomplishment is the creation of an accomplishment disparity--a disparity between what the individual has accomplished for others and what he has achieved for himself. As such a disparity grows, and as the individual becomes more aware of it, he begins to develop a dissatisfaction with his accomplishment pattern and his "outward-looking" orientation. The rise in dissatisfaction leads to more desire for self-motivated accomplishment, which if unrealized can cause a reduction of commitments to externally motivated activities, and hence the use of more capability for self-motivated accomplishment. This revised allocation of capabilities will produce less self-motivated accomplishment and more externally motivated accomplishment, and hence lead to less accomplishment disparity and a reduction of dissatisfaction.

We can now restate the dynamic hypothesis with reference to the causal-loop diagrams of this section. For the individual who goes through a crisis, his low degree of self-actualization and his high regard for rewards, both due to high unsatisfied basic needs in early phases of life, strengthen the externally motivated desires and weaken the self-motivated ones (Figure III-5). This in turn strengthens the commitment to externally motivated activities (Figure III-6), and reduces the commitment to tasks that are self-motivated. Through desires, commitments, and the experience that he gains, the individual succeeds in achieving what the others hold for him and fails to achieve what his inner self desires. This creates an accomplishment disparity and an eventual dissatisfaction with the "outward-looking" orientation (Figure III-6).

Depending on the personal and environmental characteristics of the individual, such a dissatisfaction can encourage an early reapprais-

al of accomplishment and a boost to the self-motivated desires for accomplishment, or it can result in a late reappraisal in which case a crisis is developed. An early reappraisal of accomplishments, or the one that follows a crisis, creates a boost in self-motivated desires for accomplishment (Figure III-6). This, in turn, produces an allocation of commitments in favor of self-motivated activities, which eventually results in the elimination of the accomplishment disparity and the reduction or elimination of the dissatisfaction.

In the situations where the dissatisfaction is allowed to grow to the extent that severe depression is produced, a state of paralysis can develop and capabilities for taking any action for the resolution of the crisis will be lost.

In the next section of the paper, some of the environmental and personal characteristics that allow a balanced growth and those that result in the creation of achievement crises or paralysis are explored, and some alternatives for avoiding or recovering from the crisis are discussed.

IV. RESULTS

In order to examine the hypothesis presented in the preceding section, a computer simulation model was constructed. In this section, the model is first used to generate the behavior of a "typical" individual who goes through a crisis. The insights from this analysis are then used in devising preventative measures for the "achievement crisis." These measures consist of variations in the social environment of the individual, as well as modifications in his own personal characteristics. The results of these simulations are summarized in Table 1.

The five rows in the table deal with the variations in the personal characteristics of the individual. As can be seen, only for the first row of the table (i.e., the one dealing with a "normal" crisis-prone individual), three alternative social conditions are examined. Social conditions are represented through the continuous stream of new needs generated by the environment of the individual. These are in addition to the unsatisfied basic needs that the individual might have in his childhood. They represent the stream of new needs that get generated through contacts with the peer group, friends, and the advertising network. A normal environment is assumed to be the one where new need generations equal the natural capability of the individual. This means that in any given time span, the individual is capable of accomplishing enough tasks that can satisfy all new needs generated during that period.

In the following pages, each of the tests summarized in Table 1 are explained. Section IV.1 examines a typical crisis-prone individual. For this case, which serves as a reference for subsequent tests, the stream of new needs generated is assumed to equal the natural capability of the individual. Next, in Section IV.2, the same

Social Conditions Individual Characteristics	New need generation less than natural capability of the individual	New need generation equal to natural capability of the individual	New need generation greater than natural capability of the individual
"normal" (as in the base model)	no crisis balanced growth	crisis recovery with a move towards self-motivated activities	crisis & paralysis no recovery no further growth
"normal" except higher self-exertion from early life		no crisis growth with high self-motivated accomplishment	
"normal" except - more responsiveness to dissatisfaction - more flexibility for shifting commitments		no crisis balanced growth	
- more responsiveness to dissatisfaction		crisis with different timing and severity	
- more flexibility for shifting commitments		recovery with higher self-motivated accomplishments	

TABLE 1: SUMMARY OF RESULTS

crisis-prone individual is placed under a variety of social conditions, and in each case the effect of such changes on the development of the "achievement crisis" are examined. Finally, in Section IV.3, for a given social condition (identical to the one in the reference test of Section IV-1), characteristics of the individual, such as his self-exertion, his responsiveness to dissatisfaction, and his flexibility for shifting commitments, are varied, and the effect of each variation on development and resolution of the "achievement crisis" are explored.

IV.1. A Typical Crisis-Prone Individual

The life history of an individual's accomplishment and the associated variables are shown in Figures R-1 through R-4. These plots constitute the "base run" of the model. Figure R-1 shows the lifecycle of the two categories of accomplishment, and the associated level of dissatisfaction. The sharp rise in the level of dissatisfaction, along with a severe drop in externally motivated accomplishment (between years 40 and 45), constitute the "achievement crisis". The subsequent fall in the level of dissatisfaction, the further drop in externally motivated accomplishment, and the severe rise in self-motivated accomplishment, between years 45 and 50, can be considered the resolution phase of the crisis.

The model is initialized so that it corresponds to a "typical" individual in the early stages of development. Accomplishments are low, and hence very little tradition of accomplishment has built up. Natural capability is equally divided between the activities that are motivated by others and those that are self-desired. Unsatisfied basic needs are above what is assumed to be normal for an adult. The rewards received

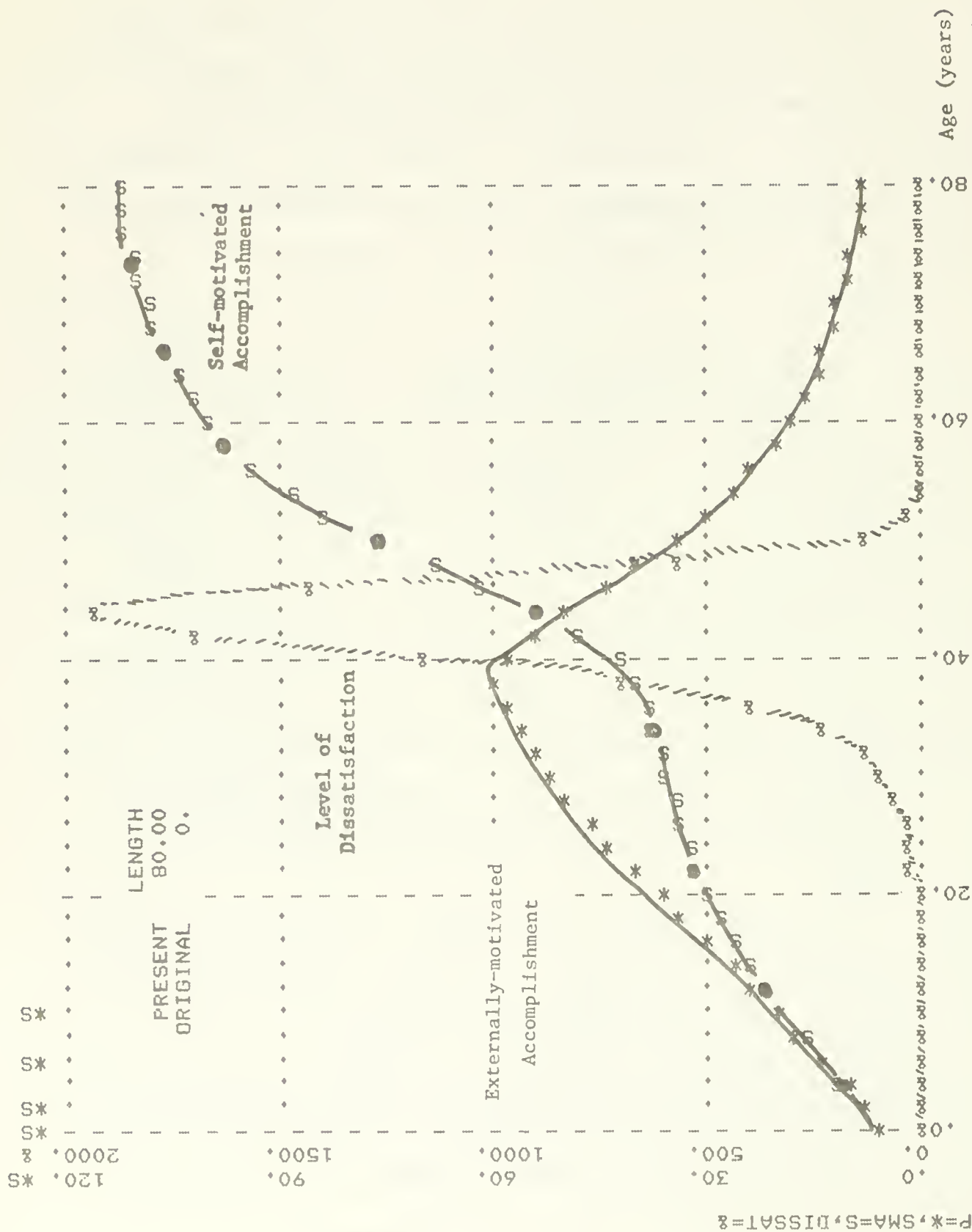


FIGURE R-1 : Typical Crisis-Prone Individual

match accomplishments. There is very little dissatisfaction in life. Autonomy, self-reliance, and self-control, all represented in the degree to which the individual is self-actualized, is below what is considered to be "normal" for an adult. The individual is exposed to a constant stream of new needs which are being generated by society, through contact with the member of a peer group, other individuals and the media. This stream of new needs is assumed to match the natural capability of the individual for dealing with them.

Due to a low degree of self-actualization, the individual initially has very little control over his needs; he needs whatever he sees. Due to a low tolerance for unsatisfied needs and the high initial needs, the individual initially places a high value on rewards from others (Figure R-2). Even though rewards are received, the rate at which they arrive and contribute to the satisfaction of basic needs is far below the rate at which lower-order needs are generated; the individual is becoming aware of the needs for food, clothing, independent housing, friendships, and social recognition. Despite the fact that some of these needs are satisfied through the rewards received for various accomplishments, since the individual's capabilities are not developed, rewards do not amount to what is expected. The individual fails to catch up with the newly generated needs that are perceived as essential.

As Figure R-2 suggests, the build-up of needs in the early years of life, mainly due to low development of capabilities and lack of experience, induces the individual to place a high value on rewards. As the individual gains more experience through self- and exogenously motivated accomplishments, there is a greater ability to satisfy basic needs independently as well as through rewards from the others. This produces a downturn in the level of unsatisfied basic needs and consequently on

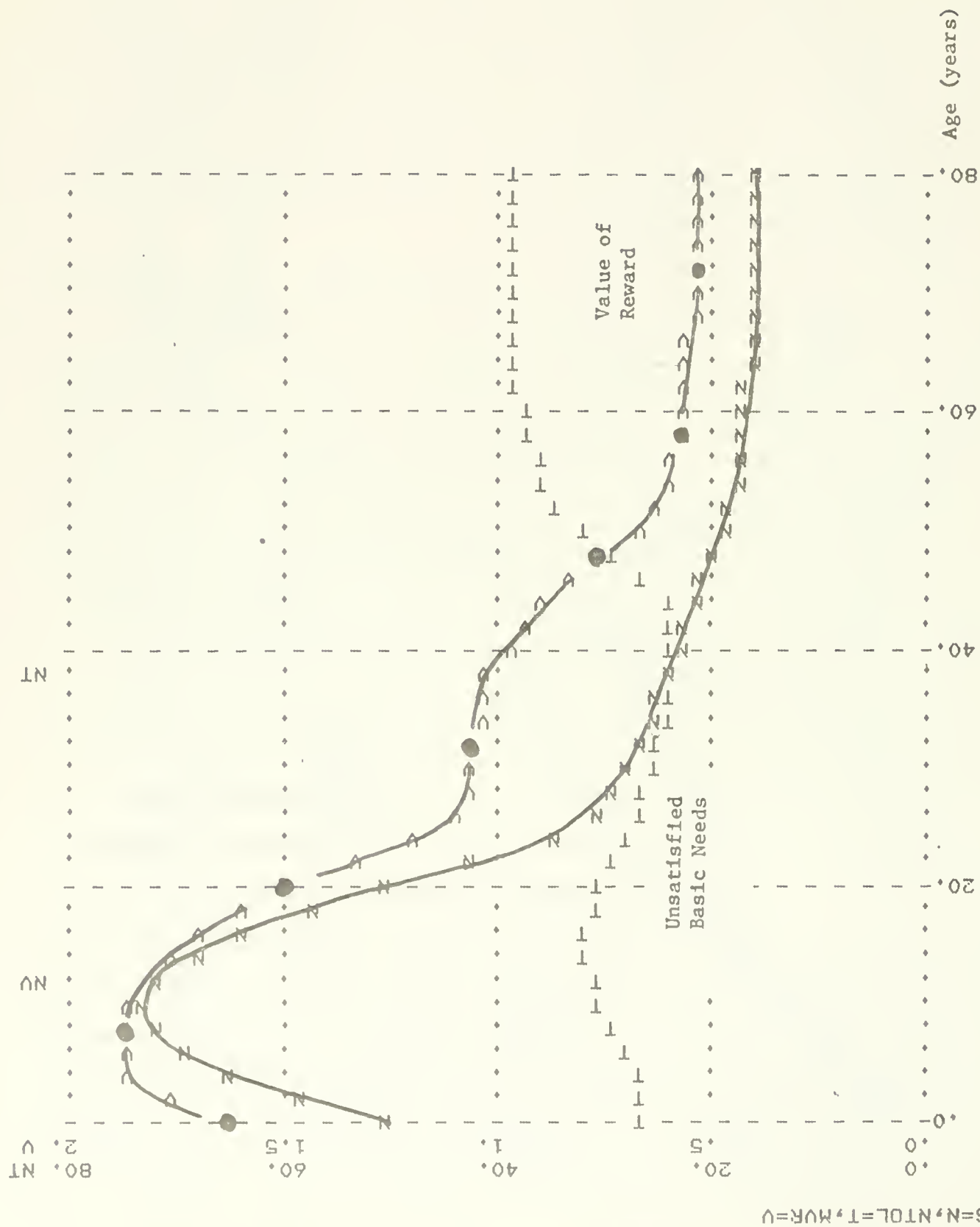


FIGURE R-2 : Typical Crisis-prone Individual

the value placed on rewards (Figure R-2). The decrease in unsatisfied needs increases the tendency for self-reliance and self-actualization. But since the individual has not yet engaged in enough self-motivated activities, the decrease in the level of needs does not produce significant improvements in the degree of self-actualization (Figure R-3). The low degree of self-actualization helps maintain the "outward-looking" orientation of the individual; recognition of new needs remains high, and reward expectations remain above performance. As such, higher commitments to externally motivated activities continues (Figure R-4).

As was explained in Section III, commitments to externally motivated tasks are expanded whenever the desires for accomplishment of such tasks exceeds the actual accomplishment. The speed with which such commitments are expanded is assumed to be dependent on the size of such unrealized desires. Similarly, commitments are withdrawn from the externally motivated task, and allocated to the self-motivated activities, based on the existence and the size of the unrealized self-motivated desires. Until the occurrence of the crisis (around year 40), the relative unrealized desires for self-motivated accomplishment (RUDS) is small (Figure R-4). As the disparity between the self-motivated and the externally motivated accomplishments rises, the individual finds himself more "outward-looking" oriented, and as such, develops a gradual dissatisfaction with his accomplishment patterns (Figure R-1). Initially, the individual does not react to the dissatisfaction. As long as the dissatisfaction is below his tolerance level, the individual effectively ignores the dissatisfaction. But the dissatisfaction accumulates, and soon exceeds the tolerable limit. The sudden rise in the level of dissatisfaction signals the beginning of the crisis (Figure R-1). The individual, dissatisfied with the fact that most of his accomplishments

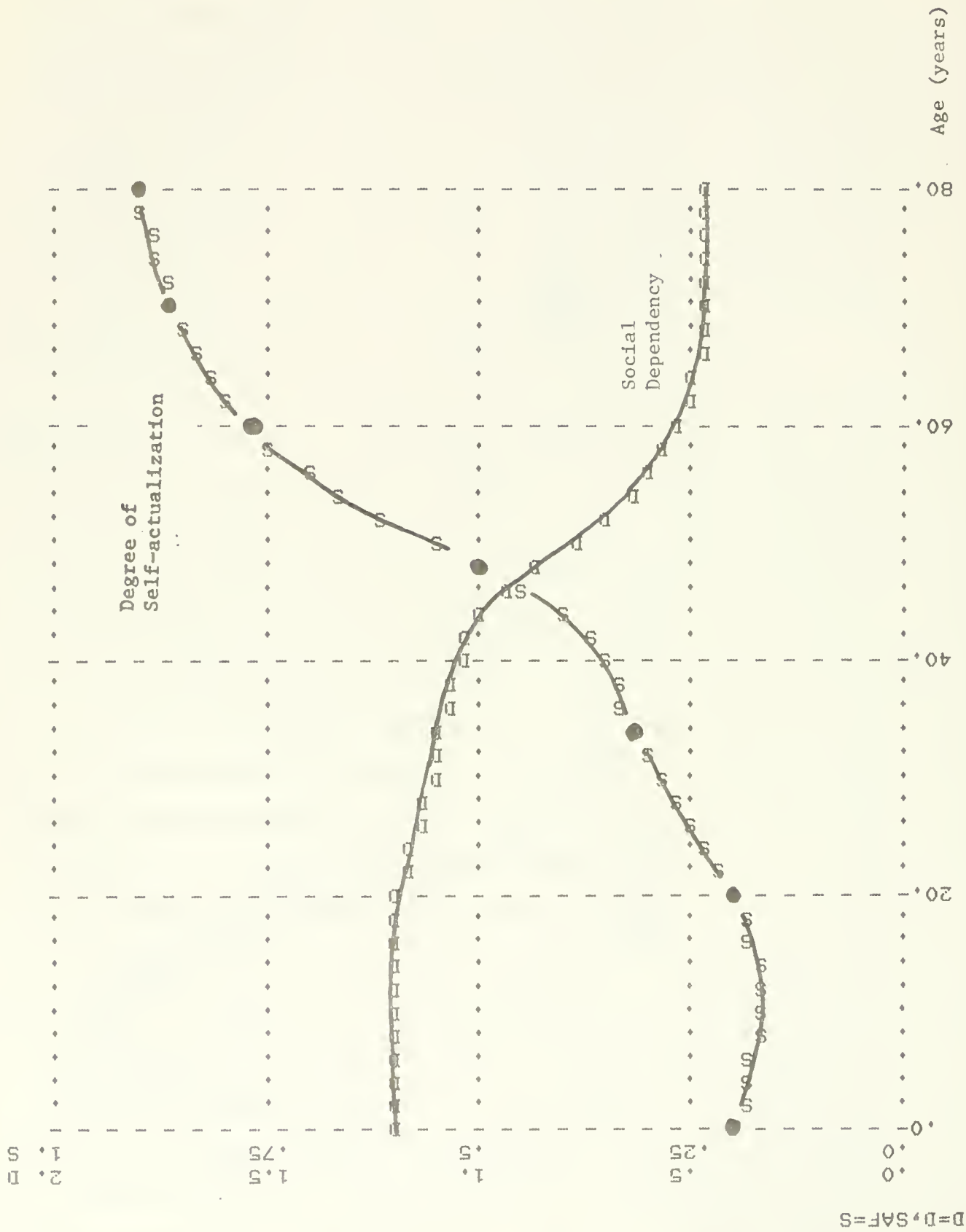


FIGURE R-3 ; Typical Crisis-prone Individual

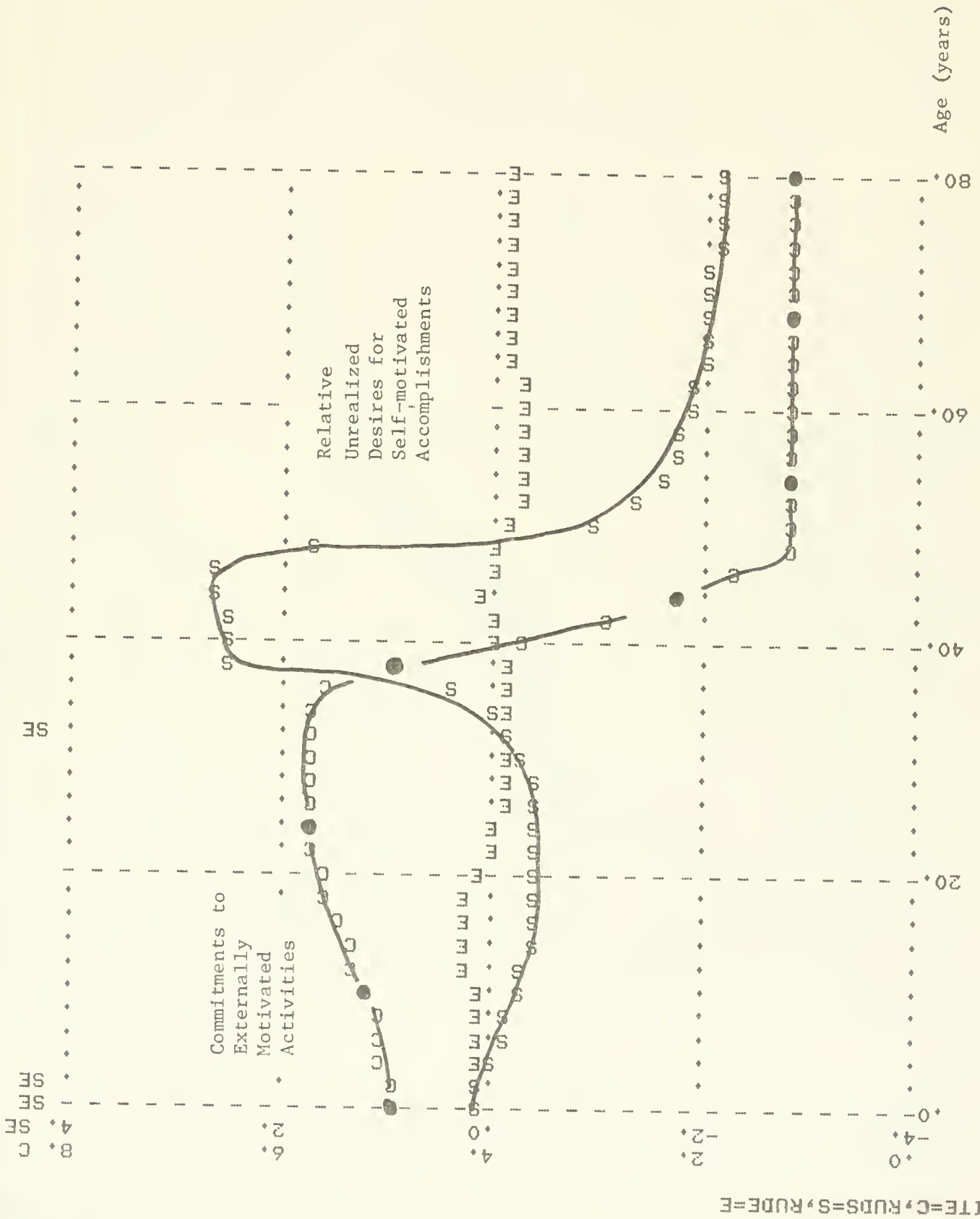
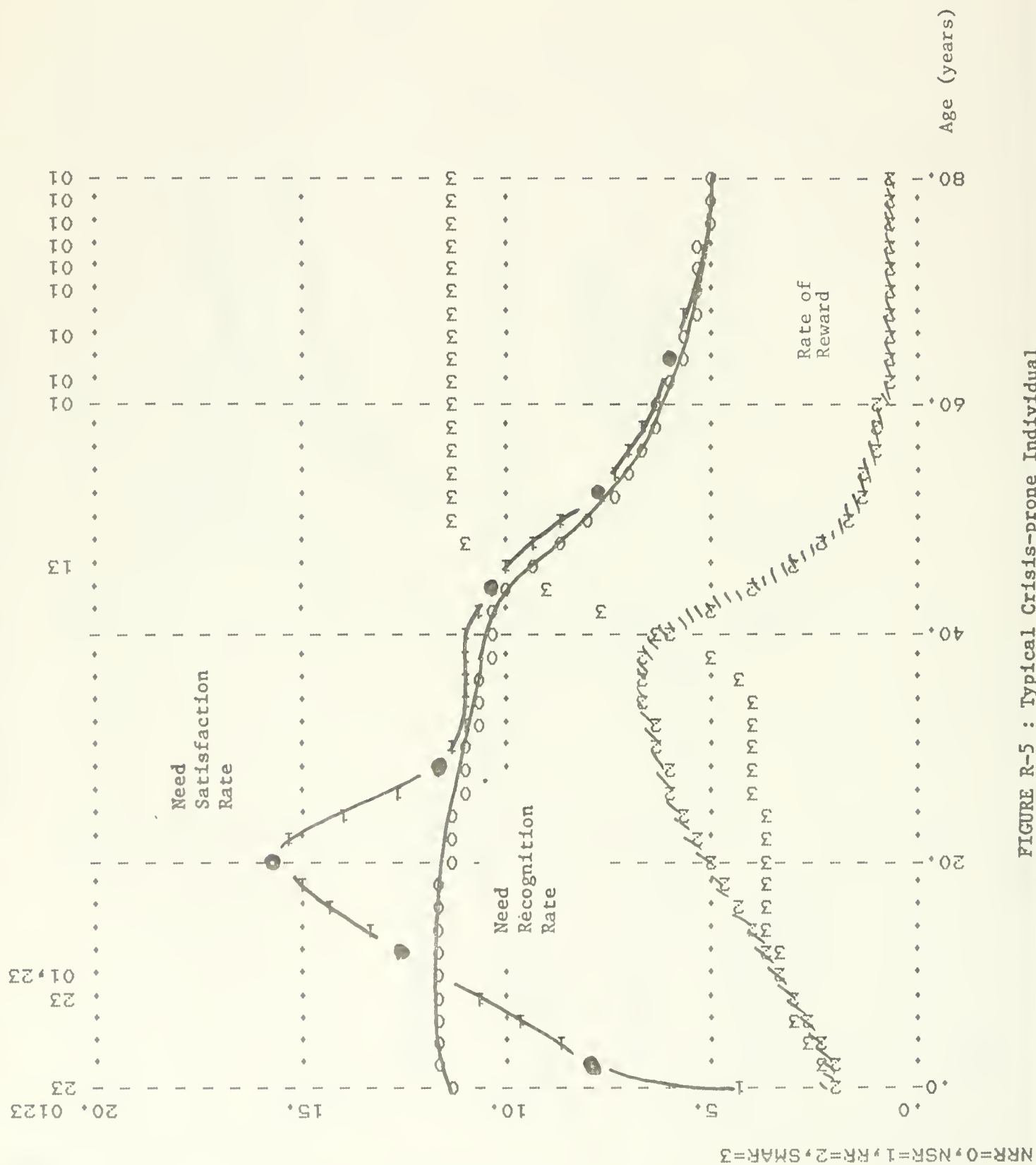


FIGURE R-4 : Typical Crisis-prone Individual



are motivated by others, begins to react by forming high desires for self-motivated activities. Since the actual self-motivated accomplishments are not appreciable, this creates a relatively high unrealized desire for self-motivated accomplishments. The result is a drastic withdrawal of commitments from the externally motivated activities at around year 40 (Figure R-4).

Withdrawal of commitments creates a sudden downturn in the externally motivated accomplishments of the individual (Figure R-1). But whatever capability withdrawn from the externally motivated activities soon becomes committed to the self-motivated activities. Thus, the individual begins to resolve the crisis by achieving more in the self-motivated domain. This eliminates the disparity between the externally motivated and the self-motivated accomplishments and thus results in the elimination of the dissatisfaction.

The rise in self-motivated accomplishment creates more tendency for self-reliance, self-control, and self-actualization. As he becomes more self-actualized, the individual develops the ability to exert more control on his needs and desires. He thus recognizes less of new needs generated by his surroundings, and develops more tolerance for unsatisfied basic needs. The effect is the attachment of a lower value on rewards, and a lower desire for externally motivated activities. The individual, subsequent to the crisis, thus continues to use an increasing portion of the existing capabilities in the service of self-motivated acts, and manages to gain more control in life and reduce dependency on others.

In summary, a "typical" crisis-prone individual becomes preoccupied with the externally motivated activities for the first 40 years of his life. As the disparity between the externally motivated and the

self-motivated accomplishments grows, a dissatisfaction is developed, which continues to grow as long as the "outward-looking" orientation is maintained. The dissatisfaction eventually becomes unbearable and leads to a crisis. The individual is forced to go through a transition period in which old commitments to tasks that were motivated by others are abandoned in favor of new commitments to what the individual genuinely desires.

Even though the individual, subsequent to the crisis, manages to return to activities that are self-motivated and personally rewarding, the experience of going through a major crisis in life is still painful and indeed costly. For years prior to the crisis, the individual has spent time and effort learning crafts, forming human relations, and building a life structure that he now finds phony, and abandons most of them in favor of more genuine undertakings. The individual cannot but wonder how much of the agony of going through a crisis could be saved if social conditions were different, or if the individual was brought up with different personal characteristics.

In the remainder of this section we try to investigate these questions, through a number of tests. In the first set of test, the social conditions surrounding the individual are altered while personal characteristics are maintained as in the base model. Next, the characteristics of the individual are changed while the social environment remains as it was originally. The effects of all such changes on the crisis and its severity are explored.

IV.2. Variations in Social Conditions

The magnitude of new needs generated in the society, relative to the natural capability of the individual, is taken as a representa-

tive measure for social conditions. Figure R-6 shows the simulation results for the case in which the demands placed on the individual, through newly-generated needs, are below the natural capabilities of the individual for dealing with such needs. This can correspond to a social environment in which the number and the magnitude of the induced needs is not very high; what becomes a necessity is really a necessity and not the product of advertisements and other inducements mechanisms. In such a case, the individual can allocate capabilities from early childhood in such a way that a balanced growth is established between self-motivated and externally motivated accomplishments. The level of dissatisfaction never rises very high and no achievement crisis is encountered throughout the individual's life.

Figure R-7 shows the simulation results for the case where the generation of new basic needs equals the natural capabilities of the individual. As discussed in Section IV.1 and as can be seen from the figure, the first half of the individual's life is filled with the accomplishments of tasks that are exogenously motivated. Concern with such needs continues to a point where the individual develops a high dissatisfaction with existing achievements. The individual manages to reevaluate commitments, and even though an achievement crisis is encountered, he is able to recover by working on the activities that are now self-motivated.

Finally, for the case in which the new need-generation exceeds the natural capabilities of the individual (Figure R-8), the crisis is of such a magnitude, and the dissatisfaction so high, that the individual becomes incapable of resolving the crisis. This can be viewed as the case where the individual enters a state of paralysis, in which he loses all hope and motivation, and effectively terminates activities of

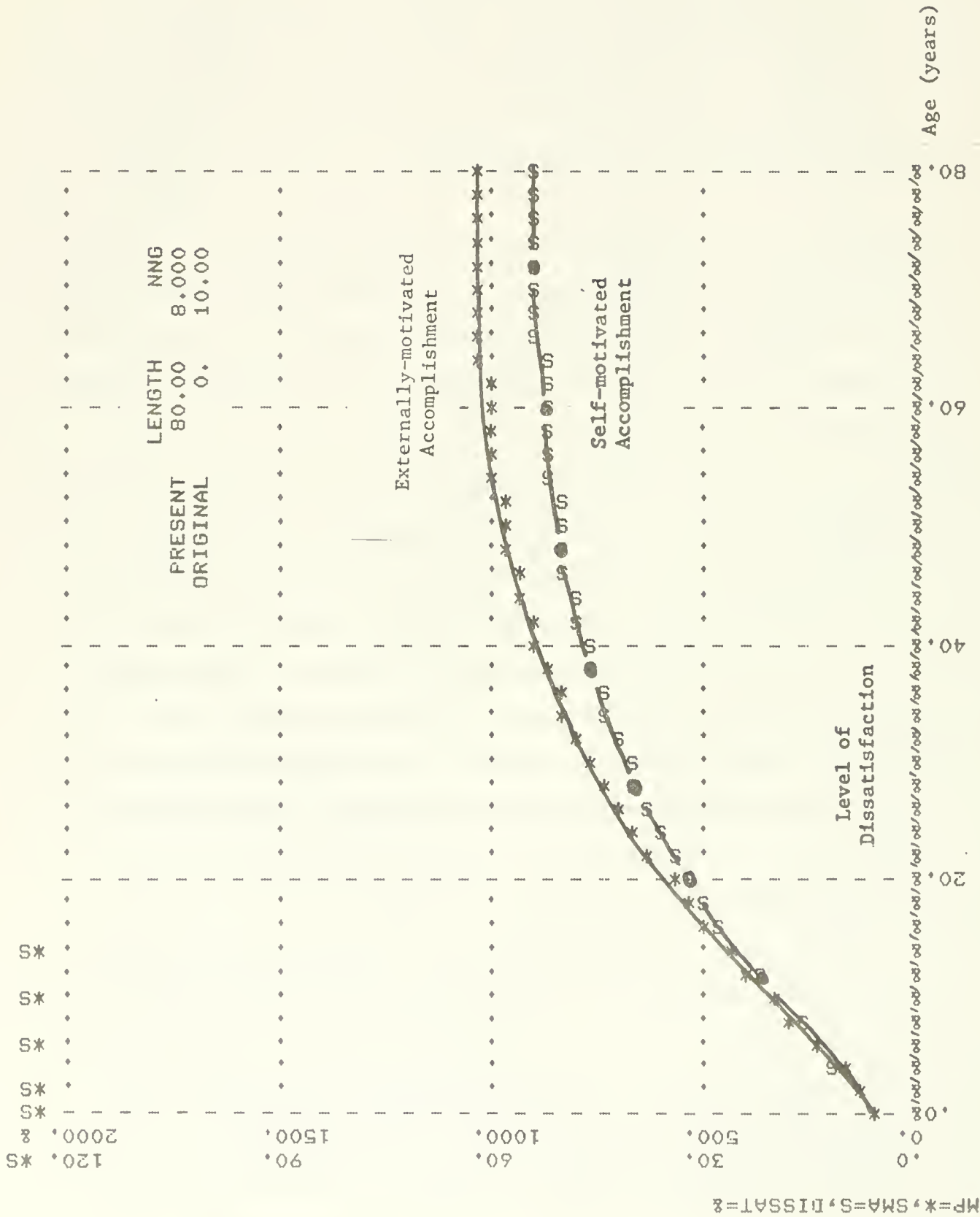


FIGURE R-6 : Generation of Needs Below Natural Capabilities of the Individual

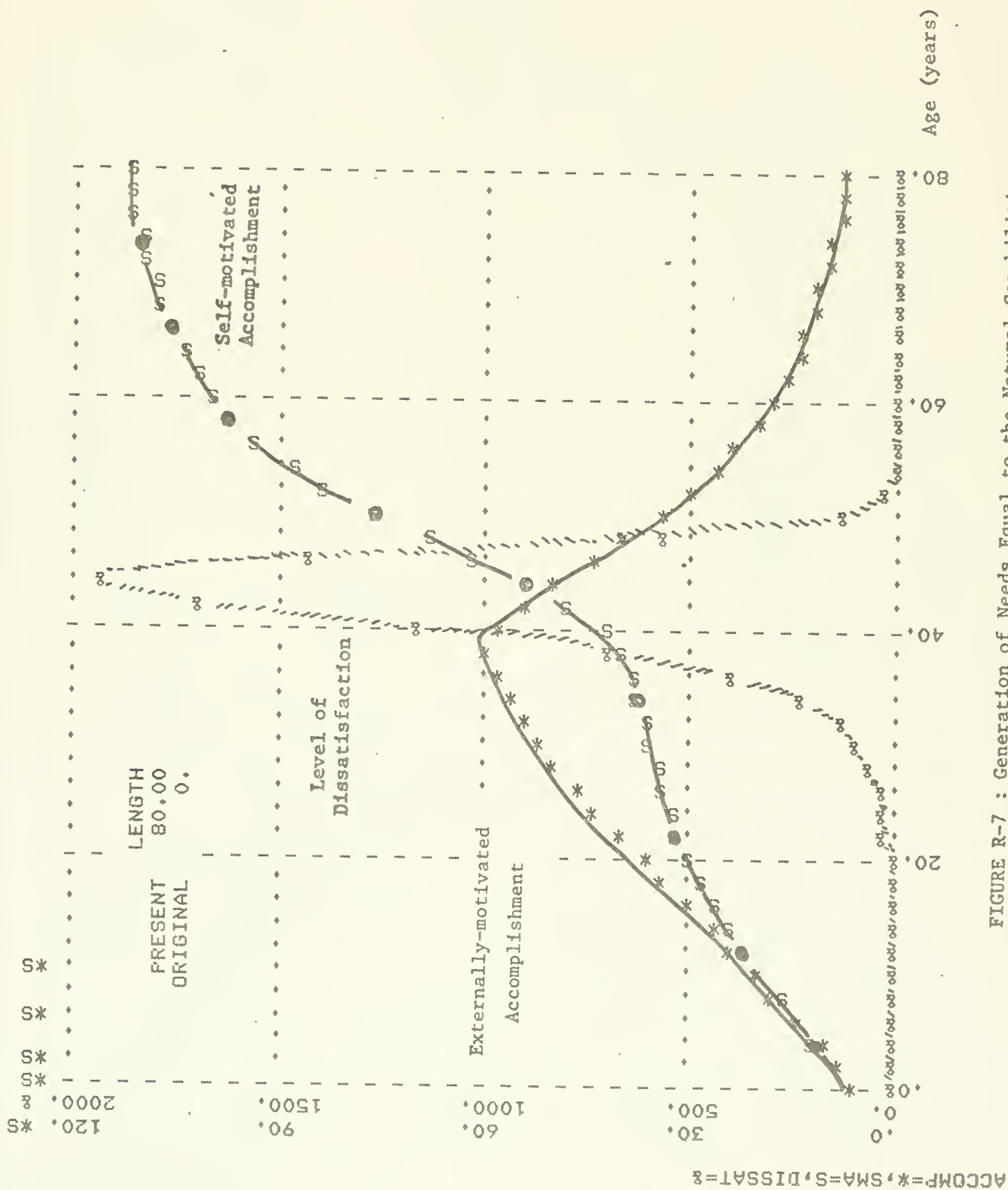


FIGURE R-7 : Generation of Needs Equal to the Natural Capabilities

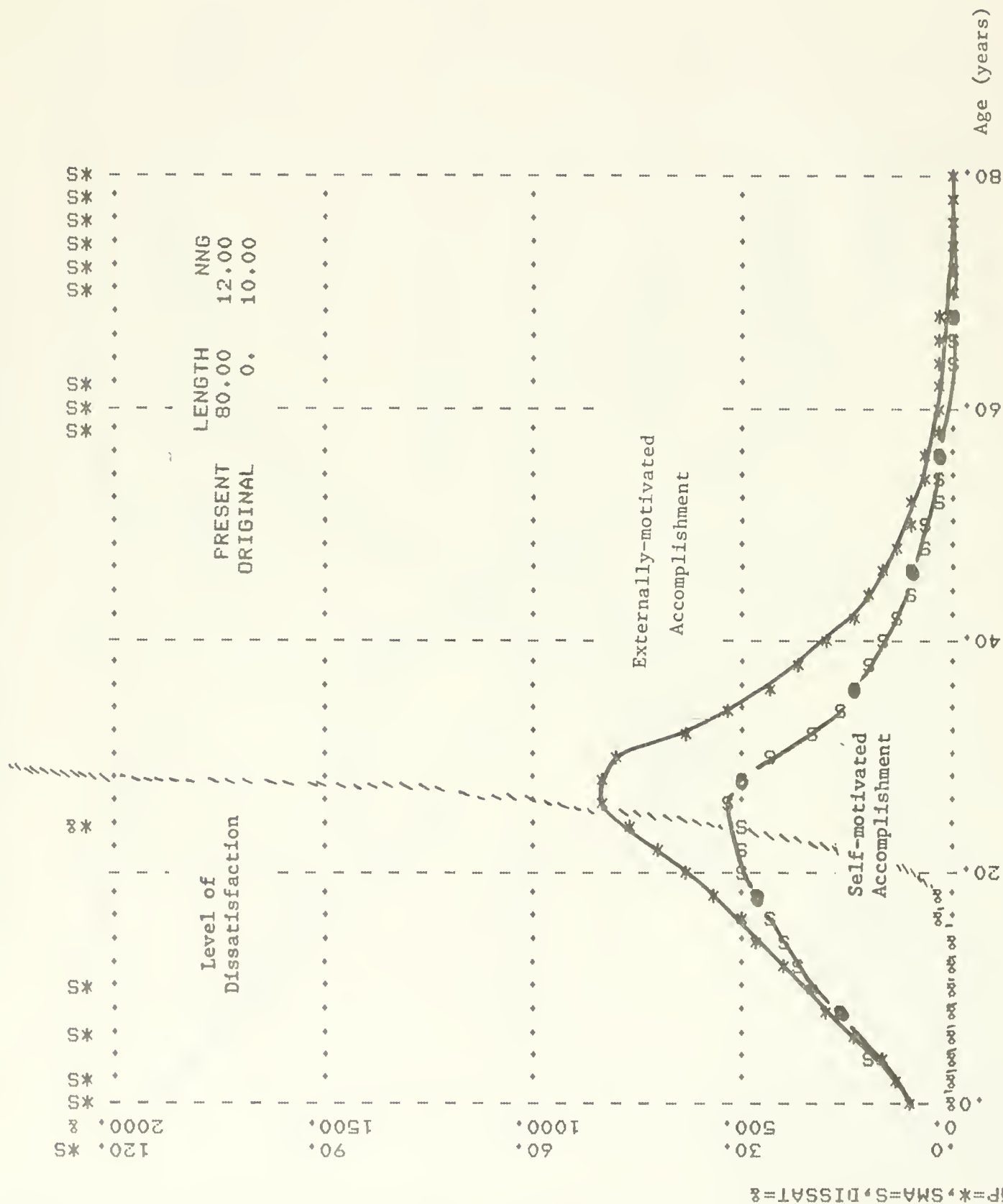


FIGURE R-8 : Generation of Needs Above the Natural Capabilities of the Individual

either category.

Based on the three tests conducted in this section, it can be seen that the social environment of the individual can play a major role in fostering an achievement crisis. Creation of new complexities in the society, passages of ever-increasing rules and regulations binding individual freedom, continuous changes in what is acceptable and what is fashionable, are all responsible for the generation of excessive new needs for the individual. To the extent that any social reform can reduce the generation of such new wants and needs for the individual, the chances of achievement crises will be reduced. But social changes are slow and hard to achieve. They are also beyond the ability of isolated individuals. For these reasons we now turn to the personal characteristics of the crisis-prone individuals and in them seek the remedy for the achievement crisis.

IV.3. Variations in Individual Characteristics

In the following set of tests, the natural capabilities of the individual are held equal to the generation of new needs in the society. As mentioned earlier, such a condition creates an achievement crisis for the typical crisis-prone individual.

As far as the individual is concerned, both natural capability and the amount of new needs generated in the society are outside the realm of personal control. This, however, does not mean that the pattern of the individual's life is dictated from without and the individual has no control. The individual can expand his capabilities through experience and does have some degree of control over the recognition of new needs. The individual has control over commitments and can also determine the degree of responsiveness to needs, expectations, rewards,

and dissatisfactions. The degree to which all such control becomes operative, however, is a matter of personality. With the assumptions that constituted the "typical" individual, he failed to grow without a crisis. The relevant question would be the extent to which such a behavior can be altered by various assumptions regarding the characteristics of the individual.

As expected, one way of avoiding the crises is through exertion of more control in one's life from early childhood. This can be achieved through a family and educational environment in which self-reliance, self-control, self-confidence, and self-respect are all integrated in the early training of the youngsters. Such a situation was simulated through the adoption of a higher initial value for the degree of self-actualization in the model. Since the degree of self-actualization controls expectations, recognition of needs, tolerance for needs, and the desire for self-motivated activities, a higher degree of self-actualization creates an atmosphere in which the individual can control ongoing activities, desires, achievements, and eventually the overall life pattern. The result of this simulation is shown in Figure R-9. The individual enjoys an uninterrupted and balanced growth throughout life, and the level of dissatisfaction never reaches the proportion that can generate a crisis.

As described previously, the typical crisis-prone individual gets preoccupied with externally motivated activities. This creates a disparity between the two categories of accomplishments, and hence results in development of dissatisfaction. The individual, however, effectively ignores the early rise in the level of dissatisfaction, and postpones any action that can alleviate it. As the process continues and the dissatisfaction accumulates, the individual develops a desire

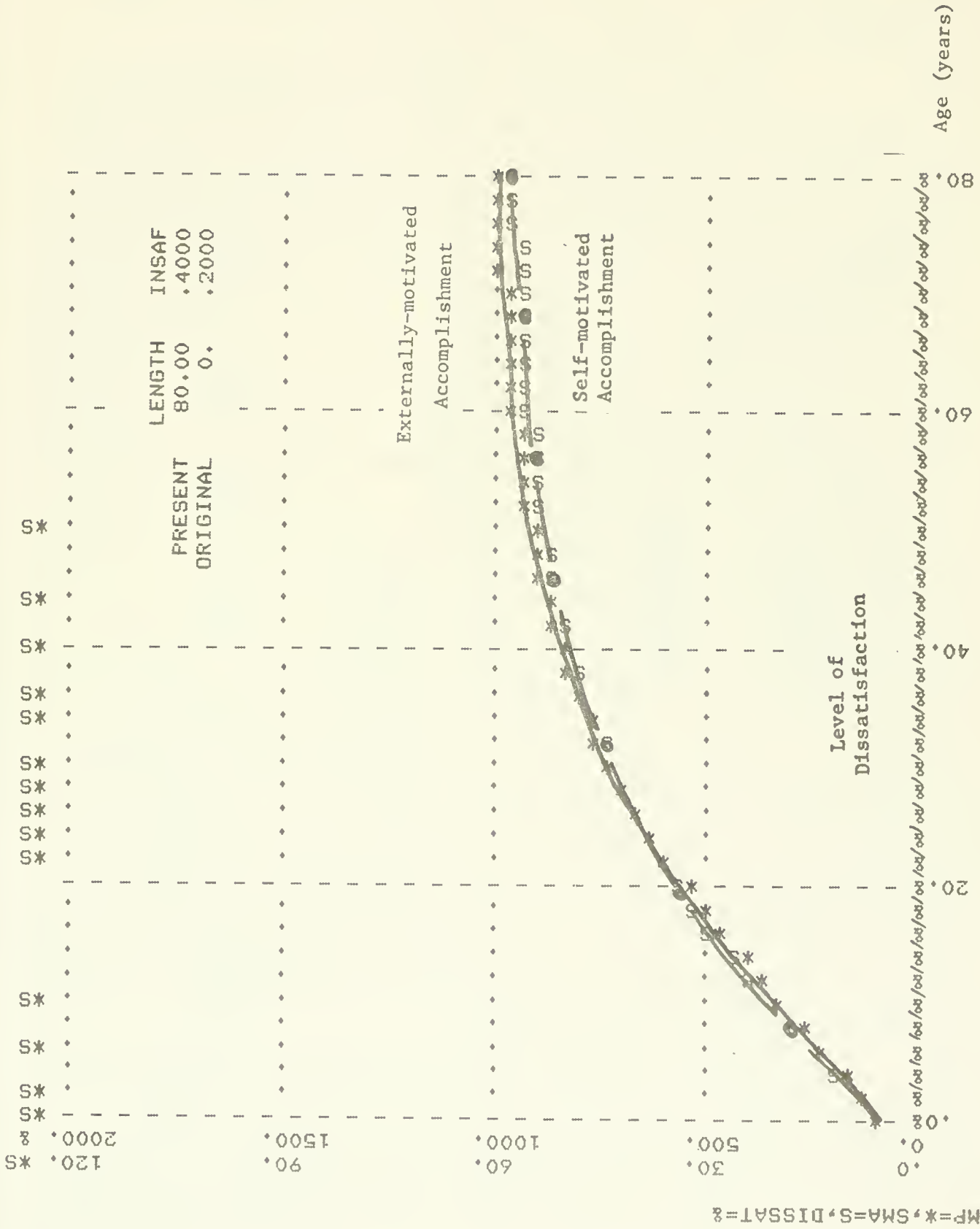


FIGURE R-9 : Higher Degree of Self-actualization from the Childhood

for self-motivated accomplishment. Such desire, however, remains unrealized due to the reluctance of the individual to shift his commitments in favor of self-motivated activities.

To modify the behavioral pattern of the crisis-prone individual, for the following simulation, shown in Figure R-10, the individual is assumed to be more responsive to the unrealized self-motivated desires, and hence more flexible in withdrawal of commitments from the externally motivated in favor of the self-motivated activities. As can be seen from Figure R-10, such a change by itself is not sufficient for the alleviation of the crisis, but can only affect the timing and the severity of it. It is true that the individual now is potentially more flexible in shifting commitments, but he will not shift any of his commitments unless he acknowledges the existence of a problem first. Since the individual tolerates moderate amounts of dissatisfaction and fails to develop the necessary desires for involvement in more of self-motivated activities, he does not realize the need for shifting commitments. To eliminate this shortcoming, the above behavioral assumption (i.e., the flexibility for shifting commitments) was combined with more sensitivity on the part of the individual by assuming a very low tolerance for dissatisfaction. The outcome (Figure R-11) shows a drastic change; the individual enjoys a balanced growth and manages to avoid an achievement crisis. The level of dissatisfaction remains very low, since any rise in it is reacted to by the individual in such a way that the dissatisfaction is alleviated.

It should be reported that as flexibility in shifting commitments by itself was not able to prevent the occurrence of the crisis, lower tolerance for dissatisfaction also is not sufficient for prevention of the crisis. It is only when the two characteristics are simul-

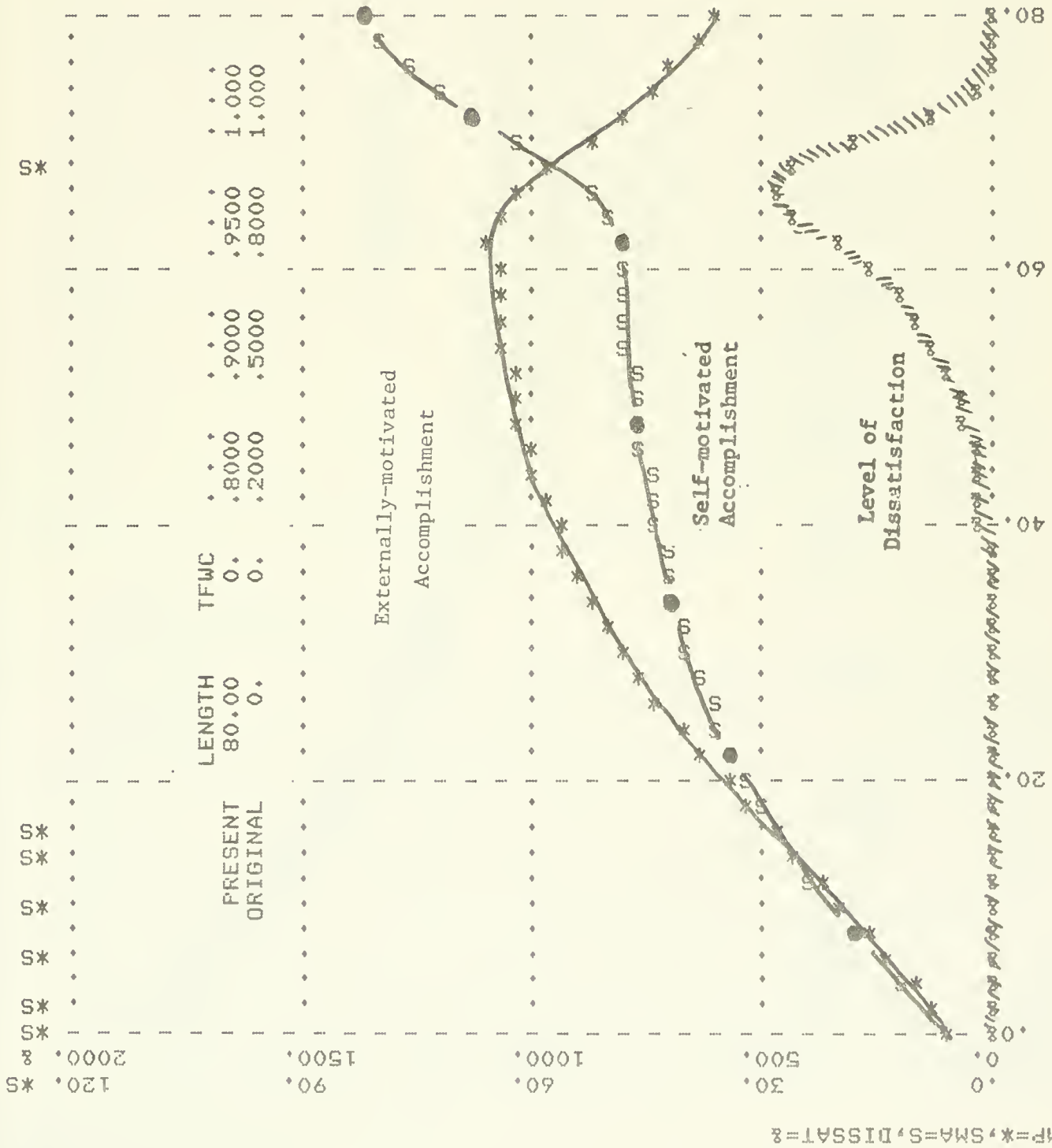


FIGURE R-10 : More Flexibility for Shifting Commitments

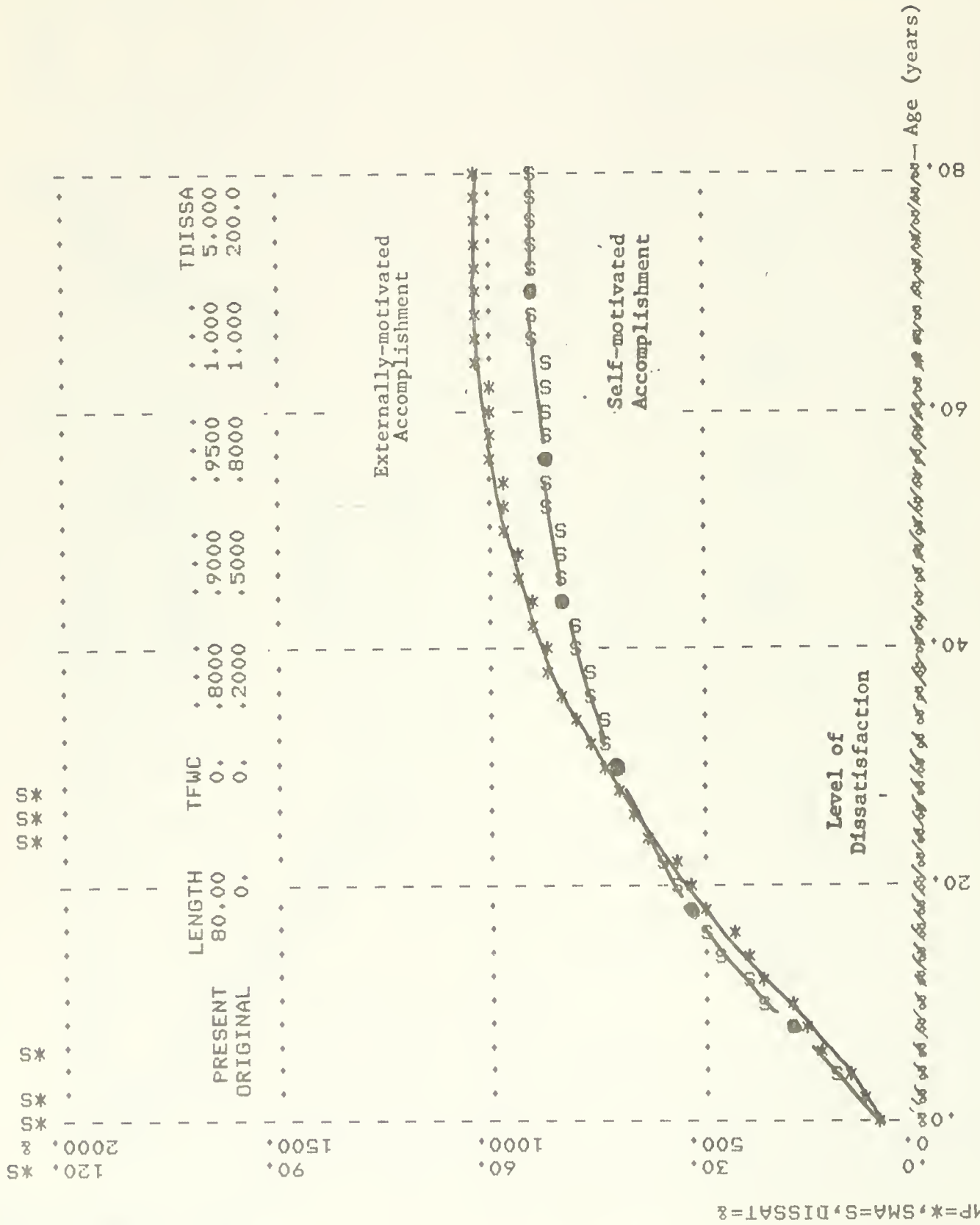


FIGURE R-11 : More Flexibility for Shifting Commitments & More Responsiveness to Dissatisfaction

taneously present in the individual that an achievement crisis can be prevented. Such characteristics necessary for the alleviation of the crisis are mostly acquired during the early training in life. This, however, does not mean that an adult, on a collision course with an achievement crisis, is not able to do anything about it. The most important duty of each adult is to perform an honest evaluation of his accomplishments. If the individual finds that most of his accomplishments are what parents, friends, and society desire, and very few are the kind of accomplishments that he personally desires, chances are high that he might run into a crisis. The individual should adopt a responsive attitude towards the disparities between what he personally desires and what others desire for him. He should admit and express his dissatisfaction with the state of affairs and should learn to devote more of his time and capabilities to the activities that are most satisfying to himself. Even though such moves might bring short-term losses, the individual can more than compensate for such losses by gaining control of his life and succeeding in anything that he genuinely desires.

IV.4. Summary of Results

Over-commitment to externally motivated activities creates a disparity between the achievements that the individual can recognize as self-motivated and those that are mainly undertaken for reward from others. To the extent that the individual is dissatisfied with such a situation and still chooses to ignore the dissatisfaction there is a greater possibility of a crisis. A high responsiveness to dissatisfaction and higher flexibility with regard to commitments can reduce the build-up of dissatisfaction and produce a balanced growth in the accomplishments of the individual without any crisis. Similar results can

also be obtained by placing more emphasis on self-reliance and control early in childhood.

Social conditions can also contribute to the generation of the achievement crisis. Whereas the generation of excessive new needs over and above the natural capability of the individual can create severe crises with tragic consequences, in societies where the individual has to deal with only moderate streams of new needs, balanced growth without any crisis can be achieved.

APPENDIX A

DETAILED MODEL AND EQUATION DESCRIPTION

In Section II a qualitative model of the achievement crisis was presented. The quantitative model underlying that of Section II is presented here. The model is based on System Dynamics methodology and is written in the DYNAMO simulation language.* The following description assumes some knowledge of the methodology, and a complete understanding of the qualitative model of Section II. Thus, even though all the interlinks present in the model are explained, justifications for some causal interconnections are not repeated in this appendix.

The model consists of seven major levels: externally motivated accomplishment ACCOMP, self-motivated accomplishment SMA, commitments to externally motivated accomplishment COMITE, dissatisfaction due to "outward-looking" orientation DISSAT, degree of self-actualization SAF, unsatisfied basic needs NEEDS, and the accumulated rewards ARWRD. The description is arranged into three parts: Part I deals with the accomplishment equations. In this part the two categories of accomplishment and the allocation of commitment between the two are described. Next in Part II desires for accomplishment and the forces creating dissatisfaction are explained. Finally, in Part III, self-actualization, needs, and rewards are explained. DYNAMO flow diagrams for different sections can be found at the end of this appendix. A complete equation listing and variable definition are included in the next appendix.

*See Reference 10 for a description of DYNAMO.

I. ACCOMPLISHMENT EQUATIONS

The accomplishment of any individual can be divided into two broad categories--externally motivated and self-motivated accomplishment. Equations related to both categories of accomplishment and the allocations of commitments between the two are described below. DYNAMO Flow Diagram I contains the interlinks for this part.

I-a. Externally Motivated Accomplishment

These are accomplishments of the tasks assigned to the individual by others. Such activities are motivated by rewards, and unless such rewards are forthcoming, no further desire for accomplishment will be exhibited. Involvement in work motivated by salary, studies for grades, and social behavior for acceptability among friends, are all examples of externally motivated activities.

Accumulation of such activities will result in a sense of accomplishment ACCOMP. This sense of accomplishment is dependent on previous accomplishments. It is increased by new additions to accomplishments ACCR, and is depleted by the rate at which the sense of accomplishment is lost (i.e., forgotten or discounted).

```

ACCOMP.K=ACCOMP.J+DT*(ACCR.JK-ADR.JK)                2, L
ACCOMP=IACMP                                           2.1, N
  ACCOMP - EXTERNALLY-MOTIVATED ACCOMPLISHMENT (UNITS)
    DT    - COMPUTATIONAL TIME INTERVAL (YEARS)
  ACCR    - EXTERNALLY-MOTIVATED ACCOMPLISHMENT RATE
             (UNITS/YEAR)
  ADR      - ACCOMPLISHMENT DISCOUNT RATE (UNITS/YEAR)
  IACMP    - INITIAL EXTERNALLY-MOTIVATED ACCOMPLISHMENT
             (UNITS)

```

Not all accomplishments of the individual are remembered.

Even though any accomplishment carries some significance immediately af-

ter its occurrence, the significance is gradually lost with the occurrence of new accomplishments. Of course, there are major accomplishments that are always remembered. But there are many other activities and accomplishments that are not considered significant, and thus forgotten very easily. Even though the duration of significance is different for different accomplishments, on the average a constant discount time can be assumed.

ADR.KL=ACCOMP.K/ADT 3, R
 ADR - ACCOMPLISHMENT DISCOUNT RATE (UNITS/YEAR)
 ACCOMP - EXTERNALLY-MOTIVATED ACCOMPLISHMENT (UNITS)
 ADT - AVERAGE DISCOUNT TIME FOR EXTERNALLY-MOTIVATED ACCOMPLISHMENT (YEARS)

The rate at which new accomplishments accrue ACCR (or what was called successful effort in the main text) is determined by past externally motivated activities, and also by the amount of natural capabilities used for such activities.

ACCR.KL=EPEMA.K*ACUEA.K 4, R
 ACCR - EXTERNALLY-MOTIVATED ACCOMPLISHMENT RATE (UNITS/YEAR)
 EPEMA - EFFECT OF PAST EXTERNALLY-MOTIVATED ACTIVITIES ON THE CAPABILITY FOR SUCH ACTS (DIMENSIONLESS)
 ACUEA - ACTUAL CAPABILITIES USED IN EXTERNALLY-MOTIVATED ACTIVITIES (ACCOMPLISHMENT UNITS/YEAR)

The effect of past experience is depicted in Figure A-1. At some normal level of accomplishment the table function assumes a value of unity. As the individual's level of accomplishment moves above some normal level, he gains experience and his accomplishment is facilitated. But for the period of life when his accomplishment is below normal, the

table function assumes a downward pressure (from lack of experience) on the accomplishment rate of the individual. (Tasks are harder to finish when the person has little experience.) At the extreme point when the individual has no previous accomplishment, only 30% of the potential capability of the individual is assumed to be available for accomplishment.

EPEMA,K=TABHL(TEPEMA,ACCOMP,K/NACMP,0,2,.5)

5, A

TEPEMA=.3/.7/1/1.2/1.3

5.1, T

EPEMA - EFFECT OF PAST EXTERNALLY-MOTIVATED
ACTIVITIES ON THE CAPABILITY FOR SUCH
ACTS (DIMENSIONLESS)

TEPEMA - TABLE FOR THE EFFECT OF PAST EXTERNALLY-
MOTIVATED ACTIVITIES (DIMENSIONLESS)

ACCOMP - EXTERNALLY-MOTIVATED ACCOMPLISHMENT (UNITS)

NACMP - NORMAL EXTERNALLY-MOTIVATED ACCOMPLISHMENT
(UNITS)

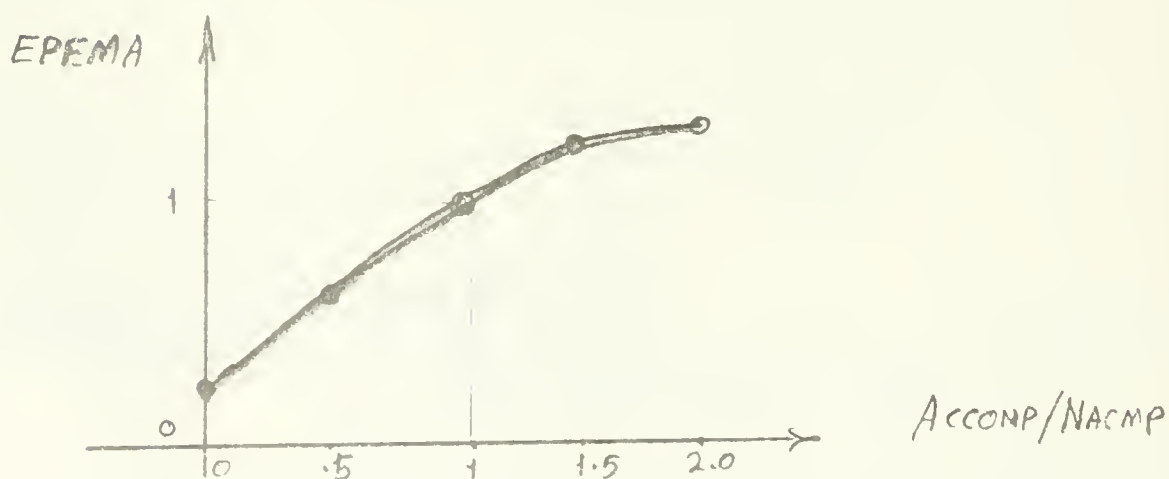


Figure A-1: Effect of Past Externally-motivated Accomplishments
on Present Capability for Such Acts

Capabilities used for externally motivated accomplishment is assumed to be equivalent to commitment to the externally motivated activities, unless such commitments exceed the actual capability of the individual.

ACUEA.K=MIN(COMITE.K,ACAP.K) 6, A
ACUEA - ACTUAL CAPABILITIES USED IN EXTERNALLY-
MOTIVATED ACTIVITIES (ACCOMPLISHMENT
UNITS/YEAR)
COMITE - COMMITMENT OF CAPABILITIES TO EXTERNALLY
MOTIVATED ACTIVITIES (ACCOMPLISHMENT
UNITS/YEAR)
ACAP - ACTUAL CAPABILITIES (ACCOMPLISHMENT UNITS/
YEAR)

Actual capabilities are equal to the constant natural capabilities of the individual unless the individual enters a state of paralysis due to

extreme levels of dissatisfaction and depression. As shown in Figure A-2, in such cases the natural capability of the individual, for any activity, are lost due to extreme depression.

```

ACAP.K=NCAP*EPRLSS.K                                     7, A
  ACAP'  - ACTUAL CAPABILITIES (ACCOMPLISHMENT UNITS/
            YEAR)
  NCAP'   - NATURAL CAPABILITIES (ACCOMPLISHMENT UNITS/
            YEAR)
  EPRLSS - EFFECT OF PARALYSIS (DIMENSIONLESS)

EPRLSS.K=TABHL(TEPRLS,DISSAT.K/LIMIT,0,1,.25)           8, A
TEPRLS=1/1/.8/.5/0                                       8.1, T
LIMIT=50*TDISSA                                           8.2, N
  EPRLSS - EFFECT OF PARALYSIS (DIMENSIONLESS)
  TEPRLS - TABLE FOR THE EFFECT OF PARALYSIS
            (DIMENSIONLESS)
  DISSAT - DISSATISFACTION WITH "OUTWARD-LOOKING"
            ORIENTATION (DISSATISFACTION UNITS)
  LIMIT  - AN UPPER LIMIT ON BEARABLE DISSATISFACTION
            (DISSATISFACTION UNITS)
  TDISSA - TOLERABLE DISSATISFACTION (DISSATISFACTION
            UNITS)

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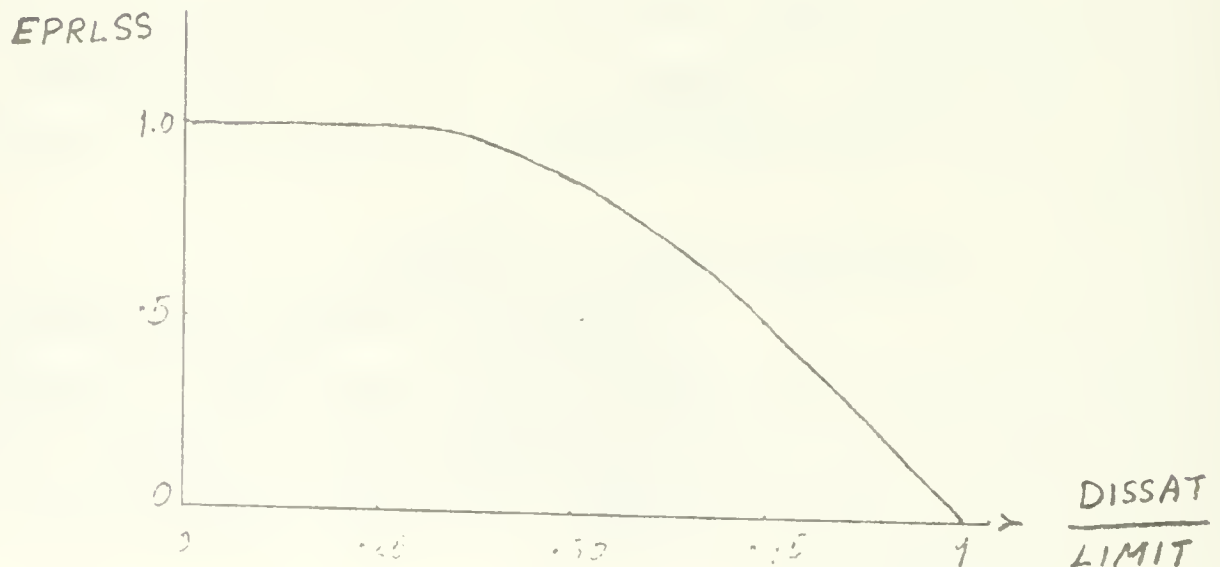


Figure A-2: Effect of Paralysis

Commitment to externally motivated activities is a level. Additions to such commitments are assumed to depend on the relative unrealized desires for externally motivated accomplishments. When this relative unrealized desire is zero, no commitments are added (Figure A-3). However, when there is a large amount of unrealized externally motivated desire, commitments are assumed to be expanded at a normal fractional rate. Similarly, withdrawal of commitments to externally motivated activities is assumed to depend on the relative unrealized desires for self-motivated accomplishment (Figure A-4). When the individual has no unrealized desires for self-motivated accomplishment, he withdraws more of his commitment to externally motivated activities. But when he forms self-motivated desires, to facilitate the realization of these desires, he needs to withdraw some of his commitments from the externally motivated activities in favor of self-motivated acts.

```

COMITE.K=COMITE.J+DT*(ACOMIT.JK-WCOMIT.JK)          9, L
COMITE=ICOMIT                                         9.1, N
  COMITE - COMMITMENT OF CAPABILITIES TO EXTERNALLY
            MOTIVATED ACTIVITIES (ACCOMPLISHMENT
            UNITS/YEAR)
  DT      - COMPUTATIONAL TIME INTERVAL (YEARS)
  ACOMIT - ADDITIONS OF COMMITMENTS TO EXTERNALLY
            MOTIVATED ACTIVITIES (ACCOMPLISHMENT
            UNITS/YEAR/YEAR)
  WCOMIT - WITHDRAWAL OF COMMITMENTS FROM EXTERNALLY
            MOTIVATED ACTIVITIES (ACCOMPLISHMENT
            UNITS/YEAR/YEAR)
  ICOMIT - INITIAL COMMITMENT (COMMITMENT UNITS)

```

ACOMIT.KL=COMITE.K*FAC.K 10, R

ACOMIT - ADDITIONS OF COMMITMENTS TO EXTERNALLY
MOTIVATED ACTIVITIES (ACCOMPLISHMENT
UNITS/YEAR/YEAR)

COMITE - COMMITMENT OF CAPABILITIES TO EXTERNALLY
MOTIVATED ACTIVITIES (ACCOMPLISHMENT
UNITS/YEAR)

FAC - FRACTIONAL ADDITIONS OF COMMITMENTS TO
EXTERNALLY-MOTIVATED ACTIVITIES
(FRACTIONS/YEAR)

FAC.K=NFAC*TABHL(TFAC, RUDE.K, 0, 4, 1)

11, A

TFAC=0/.2/.5/.8/1

11.1, T

FAC - FRACTIONAL ADDITIONS OF COMMITMENTS TO
EXTERNALLY-MOTIVATED ACTIVITIES
(FRACTIONS/YEAR)

NFAC - NORMAL FRACTIONAL ADDITIONS OF COMMITMENTS
TO EXTERNALLY-MOTIVATED ACTIVITIES
(FRACTIONS/YEAR)

TFAC - TABLE FOR FRACTIONAL ADDITIONS TO
COMMITMENTS (DIMENSIONLESS)

RUDE - RELATIVE UNSATISFIED DESIRES FOR
EXTERNALLY-MOTIVATED ACTIVITIES
(DIMENSIONLESS)

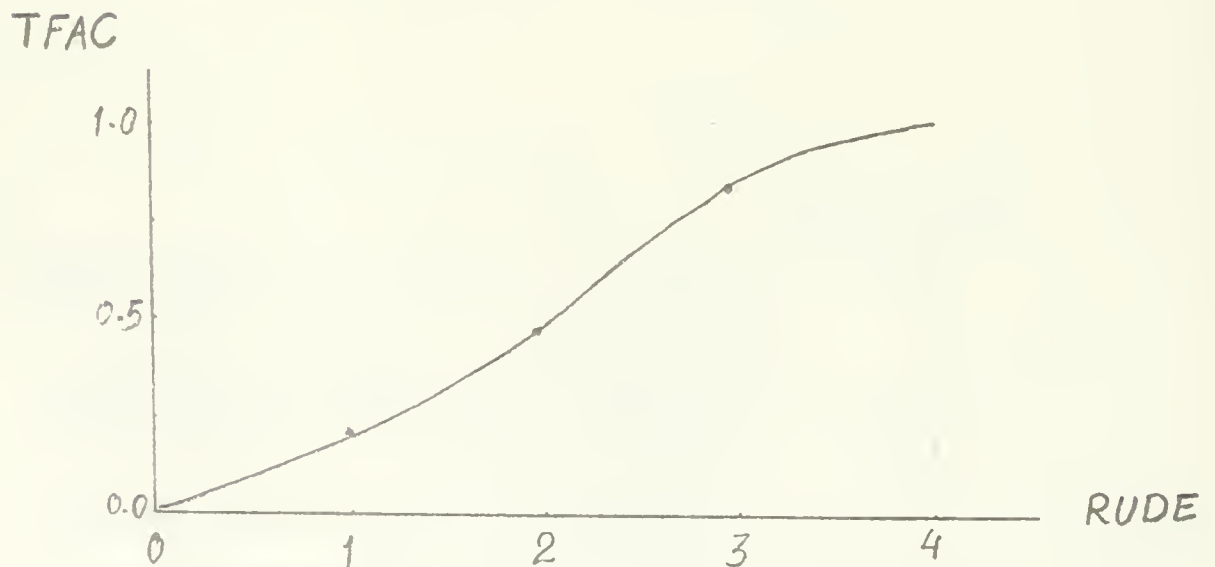


Figure A-3: Effect of Unrealized Desires for Externally-motivated Accomplishment, on fractional additions to Commitments

RUDE.K=(EMDA.K-ACCOMP.K)/NACMP 12, A

RUDE - RELATIVE UNSATISFIED DESIRES FOR
EXTERNALLY-MOTIVATED ACTIVITIES
(DIMENSIONLESS)

EMDA - EXTERNALLY MOTIVATED DESIRES FOR
ACCOMPLISHMENT (UNITS)

ACCOMP - EXTERNALLY-MOTIVATED ACCOMPLISHMENT (UNITS)

NACMP - NORMAL EXTERNALLY-MOTIVATED ACCOMPLISHMENT
(UNITS)

WCOMIT.KL=COMITE.K*FWC.K 13, R

WCOMIT - WITHDRAWAL OF COMMITMENTS FROM EXTERNALLY
MOTIVATED ACTIVITIES (ACCOMPLISHMENT
UNITS/YEAR/YEAR)

COMITE - COMMITMENT OF CAPABILITIES TO EXTERNALLY
MOTIVATED ACTIVITIES (ACCOMPLISHMENT
UNITS/YEAR)

FWC - FRACTIONAL WITHDRAWAL OF COMMITMENTS FROM
EXTERNALLY-MOTIVATED ACTIVITIES
(FRACTIONS/YEAR)

FWC.K=NFWC*TABHL(TFWC,RUDS.K,0,4,1) 14, A

TFWC=0/.2/.5/.8/1 14.1, T

FWC - FRACTIONAL WITHDRAWAL OF COMMITMENTS FROM
EXTERNALLY-MOTIVATED ACTIVITIES
(FRACTIONS/YEAR)

NFWC - NORMAL FRACTIONAL WITHDRAWAL OF COMMITMENTS
FROM EXTERNALLY-MOTIVATED ACTIVITIES
(FRACTIONS/YEAR)

TFWC - TABLE FOR FRACTIONAL WITHDRAWAL OF
COMMITMENTS (DIMENSIONLESS)

RUDS - RELATIVE UNSATISFIED DESIRES FOR SELF-
MOTIVATED ACTIVITIES (DIMENSIONLESS)

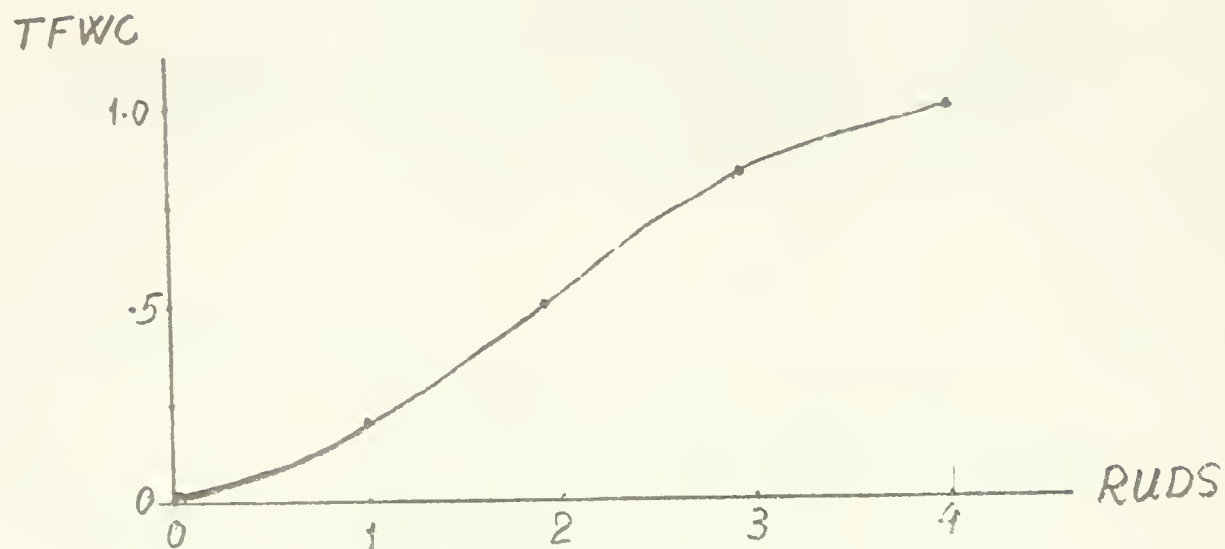


Figure A-4: Effect of Unrealized Desires for Self-motivated Accomplishment, on the withdrawal of Commitments

$$RUDS.K = (SMDA.K - SMA.K) / NSMA$$

15, A

- RUDS - RELATIVE UNSATISFIED DESIRES FOR SELF-MOTIVATED ACTIVITIES (DIMENSIONLESS)
 SMA - SELF-MOTIVATED ACCOMPLISHMENT (UNITS)
 NSMA - NORMAL SELF-MOTIVATED ACCOMPLISHMENT (UNITS)

I-b. Self-Motivated Accomplishment

The set of equations for self-motivated accomplishment are structurally similar to the ones for externally motivated accomplishment. Self-motivated accomplishments are discounted through the rate at which such accomplishments are forgotten or lose their significance. They are gained through the use of actual capabilities, again modified by past experience in such activities. The actual capability used for self-motivated activities is the difference between the total natural capability of the individual and what is used for externally motivated activities.

SMA.K=SMA.J+DT*(SMAR.JK-SMADR.JK)	16, L
SMA=ISMA	16.1, N
SMA - SELF-MOTIVATED ACCOMPLISHMENT (UNITS)	
DT - COMPUTATIONAL TIME INTERVAL (YEARS)	
SMAR - SELF-MOTIVATED ACCOMPLISHMENT RATE (UNITS/YEAR)	
SMADR - SELF-MOTIVATED ACCOMPLISHMENT DISCOUNT RATE (UNITS/YEAR)	
ISMA - INITIAL SELF-MOTIVATED ACCOMPLISHMENT (DIMENSIONLESS)	
SMADR.KL=SMA.K/ADTSMA	17, R
SMADR - SELF-MOTIVATED ACCOMPLISHMENT DISCOUNT RATE (UNITS/YEAR)	
SMA - SELF-MOTIVATED ACCOMPLISHMENT (UNITS)	
ADTSMA - AVERAGE DISCOUNT TIME FOR SELF-MOTIVATED ACCOMPLISHMENT (YEARS)	
SMAR.KL=EPSMA.K*ACUSA.K	18, R
SMAR - SELF-MOTIVATED ACCOMPLISHMENT RATE (UNITS/YEAR)	
EPSMA - EFFECT OF PAST SELF-MOTIVATED ACTIVITIES ON THE CAPABILITY FOR SUCH ACTS (DIMENSIONLESS)	
ACUSA - ACTUAL CAPABILITIES USED FOR SELF-MOTIVATED ACTIVITIES (ACCOMPLISHMENT UNITS/YEAR)	

EPSMA.K=TABHL(TEPSMA,SMA.K/NSMA,0,2,.5)

19, A

TEPSMA=.3/.7/1/1.2/1.3

19.1, T

EPSMA - EFFECT OF PAST SELF-MOTIVATED ACTIVITIES ON
THE CAPABILITY FOR SUCH ACTS
(DIMENSIONLESS)

TEPSMA - TABLE FOR THE EFFECT OF PAST SELF-
MOTIVATED ACTIVITIES (DIMENSIONLESS)

SMA - SELF-MOTIVATED ACCOMPLISHMENT (UNITS)

NSMA - NORMAL SELF-MOTIVATED ACCOMPLISHMENT
(UNITS)

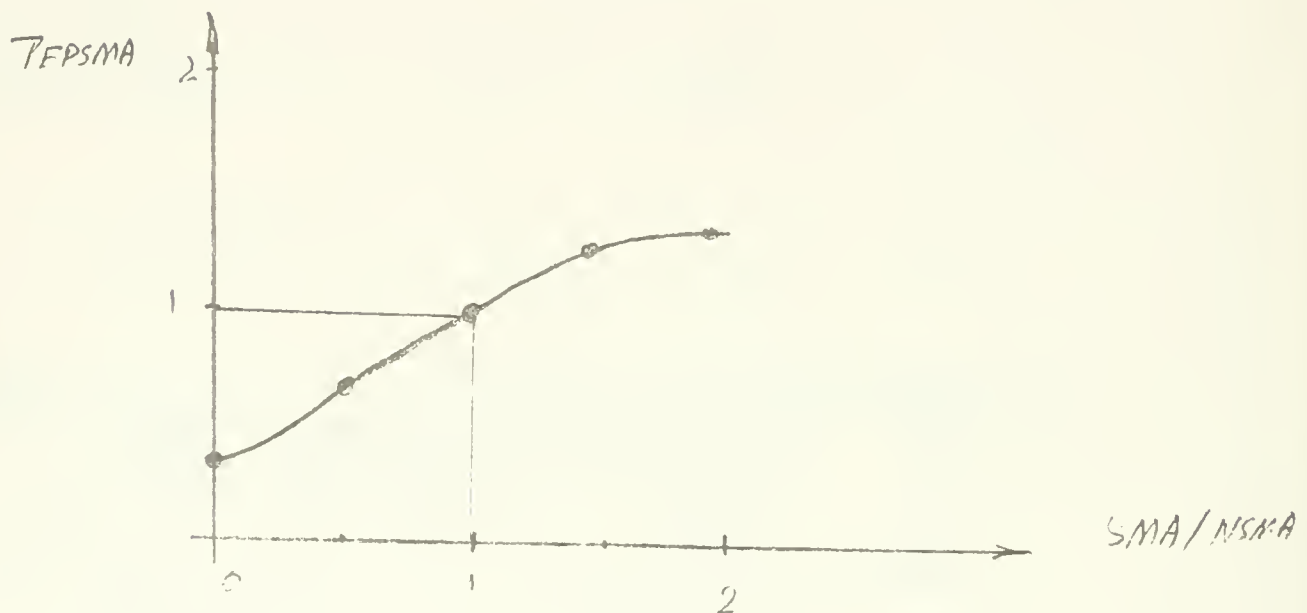


Figure A-5: Effect of Past Self-motivated Activities on the
Present Capability for Such Acts

ACUSA.K=ACAP.K-ACUEA.K

20, A

ACUSA - ACTUAL CAPABILITIES USED FOR SELF-MOTIVATED
ACTIVITIES (ACCOMPLISHMENT UNITS/YEAR)

ACAP - ACTUAL CAPABILITIES (ACCOMPLISHMENT UNITS/
YEAR)

ACUEA - ACTUAL CAPABILITIES USED IN EXTERNALLY-
MOTIVATED ACTIVITIES (ACCOMPLISHMENT
UNITS/YEAR)

II. EQUATIONS FOR DESIRE

II-a. Externally Motivated Desire

As can be seen in DYNAMO Flow Diagram 11-a, the externally motivated desire for accomplishment is determined by three factors: perceived duty (or what the individual perceives as being expected of him), the value of the rewards that the individual might receive as a result of conforming to his duties, and finally, the perceived likelihood of an accomplishment resulting in a reward.

EMDA.K=PDUTY.K*MVR.K*LABR.K 21, A

EMDA - EXTERNALLY MOTIVATED DESIRES FOR
ACCOMPLISHMENT (UNITS)

PDUTY - PERCEIVED DUTY (ACCOMPLISHMENT UNITS)

MVR - MULTIPLIER FOR THE VALUE OF REWARD
(DIMENSIONLESS)(DIMENSIONLESS)

LABR - LIKELIHOOD OF ANY ACCOMPLISHMENT BEING
REWARDED (DIMENSIONLESS)

Perceived duty is determined by the perceived society expectations for accomplishment PEA, and by the dependency of the individual on social values.

PDUTY.K=PEA.K*DPEND.K 22, A

PDUTY - PERCEIVED DUTY (ACCOMPLISHMENT UNITS)

PEA - PERCEIVED EXPECTED ACCOMPLISHMENT (UNITS)

DPEND - DEPENDENCY FACTOR (DIMENSIONLESS)

The perceived expectations for accomplishment is a delay of actual expectations EA, which, in turn, is a function of the rewards that the individual has received and still remembers having received.

```

PEA.K=SMOOTH(EA.K,TPEA)                                23, A
PEA      - PERCEIVED EXPECTED ACCOMPLISHMENT (UNITS)
SMOOTH   - A FUNCTION FOR PRODUCING DELAYS OR AVERAGES
EA       - EXPECTED ACCOMPLISHMENT (UNITS)
TPEA     - TIME TO PERCEIVE EXPECTED ACCOMPLISHMENT
           (YEARS)

EA.K=NEAPUR*ARWRD.K                                    24, A
EA       - EXPECTED ACCOMPLISHMENT (UNITS)
NEAPUR   - NORMAL EXPECTED ACCOMPLISHMENT PER UNITS OF
           REWARD
ARWRD    - ACCUMULATED REWARDS (UNITS)

```

The dependency of the individual on social values is a function of his degree of self-actualization. A fully self-actualized person is much less dependent on social values than others. On the other hand, with less self-actualization the individual feels more obliged to meet the expectations of society and hence would have a higher value for the dependency factor. The table in Figure A-6 is normalized around an arbitrarily selected "normal" degree of self-actualization (NSAFT = 40%).

```

DPEND.K=TABHL(TDPEND,SAF.K/NSAFT,0,3,.5)                25, A
TDPEND=1.3/1.2/1/.7/.5/.4/.3                            25.1, T
DPEND    - DEPENDENCY FACTOR (DIMENSIONLESS)
TDPEND   - TABLE FOR THE DEPENDENCY FACTOR
           (DIMENSIONLESS)
SAF      - SELF-ACTUALIZATION FRACTION (DIMENSIONLESS)
NSAFT    - NORMAL SELF-ACTUALIZATION TENDENCY
           (DIMENSIONLESS)

```

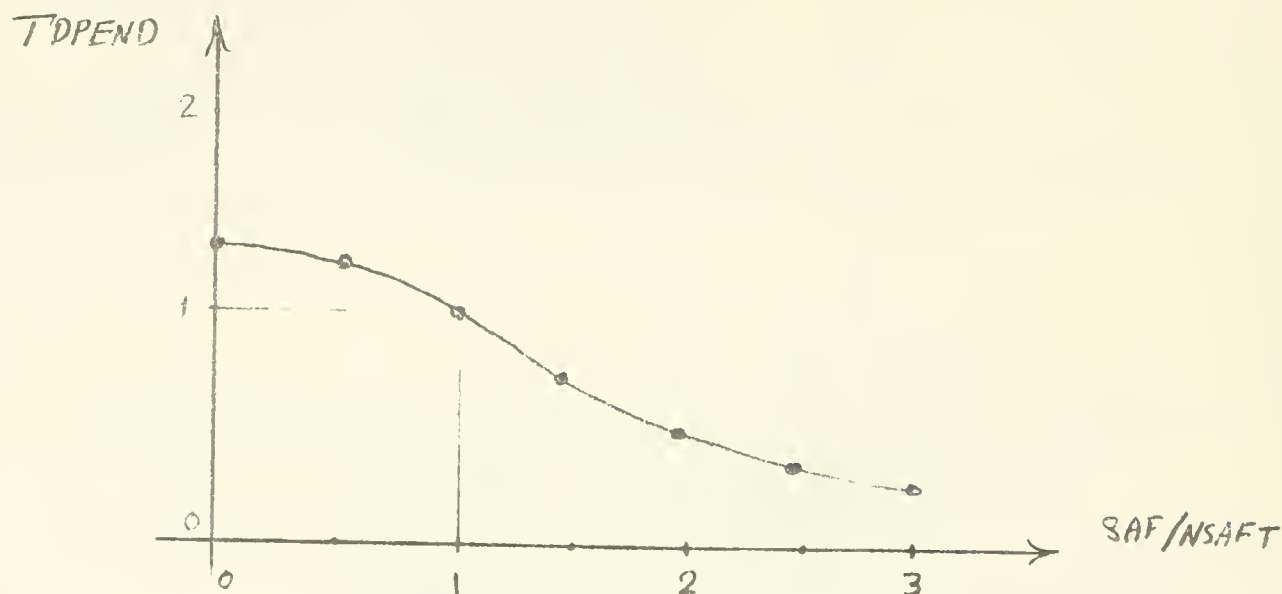


Figure A-6: Effect of Self-actualization on Dependency

A second factor in the formation of desires to accomplish is the extent to which any reward is valuable to the individual. The value of the reward is a function of the individual's need ratio NR which measures the unsatisfied low-order needs as against the tolerance for such needs (Figure A-7). As the individual becomes "needier," his need ratio rises, and he subsequently places more value on any rewards he might receive. On the other hand, as more and more of his needs are satisfied (or alternatively, as the tolerance for basic low-order needs is expanded), the need ratio falls and subsequently the individual places a lower value on material and social rewards.

MVR.K=TABHL(TMVR,NR.K,0,3,.5)

26, A

TMVR=.3/.6/1/1.4/1.7/1.9/2

26.1, T

MVR - MULTIPLIER FOR THE VALUE OF REWARD
(DIMENSIONLESS)(DIMENSIONLESS)

TMVR - TABLE FOR THE VALUE OF REWARD
(DIMENSIONLESS)

NR - NEED RATIO (DIMENSIONLESS)REWARDED
(DIMENSIONLESS)

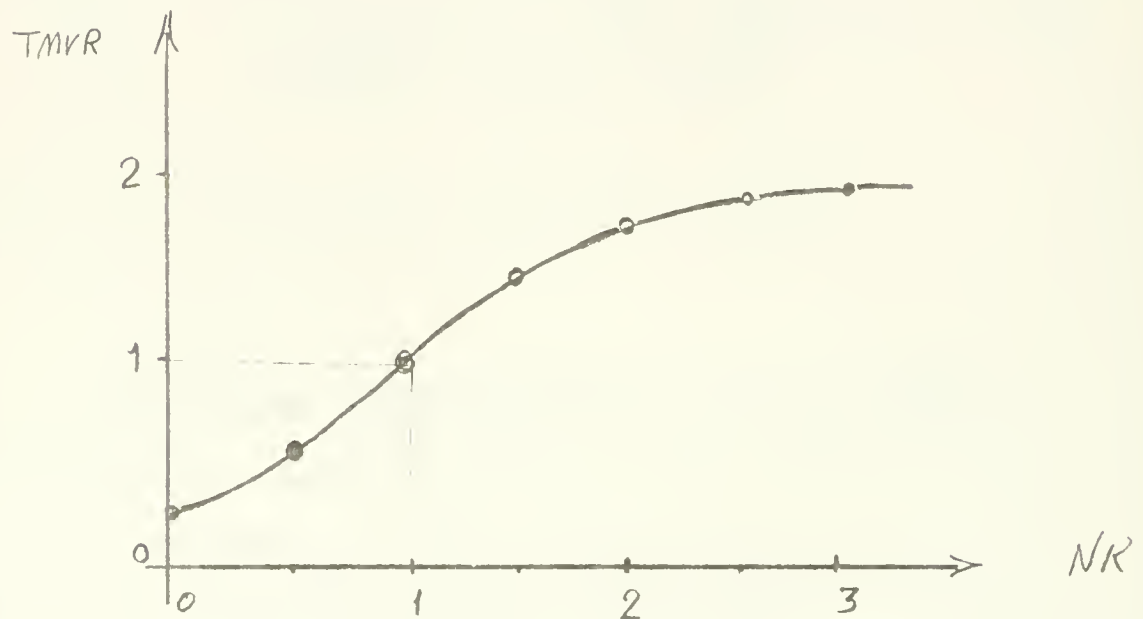


Figure A-7: Effect of Unsatisfied basic Needs on the Value of Reward

The third and final determinant of desires to accomplish is represented by LABR, which measures the likelihood that an accomplishment will result in a reward (Figure A-8). The expectancy ratio--the ratio of expected rewards communicated to the actual rewards delivered--serves as the determinant of PABR. When this ratio is unity, the table assumes a value of unity, or a neutral influence on desires.

As the expectancy ratio rises, meaning that the rewards received by the individual are below his expectations, a negative attitude develops and the individual discounts the possibility that the future accomplishments will result in rewards. In this case, LABR falls below unity and hence exerts downward pressure on the desire to accomplish. A similar argument shows how a low expectancy ratio can create a positive attitude and hence a high LABR.

LABR,K=TABHL(TLABR,ER,K,0,2,.25) 27, A
 TLABR=1.3/1.25/1.2/1.15/1/.85/.7/.6/.5 27.1, T
 LABR - LIKELIHOOD OF ANY ACCOMPLISHMENT BEING
 REWARDED (DIMENSIONLESS)
 TLABR - TABLE FOR THE LIKELIHOOD OF ANY
 ACCOMPLISHMENT BEING REWARDED
 (DIMENSIONLESS)
 ER - EXPECTANCY RATIO (DIMENSIONLESS)

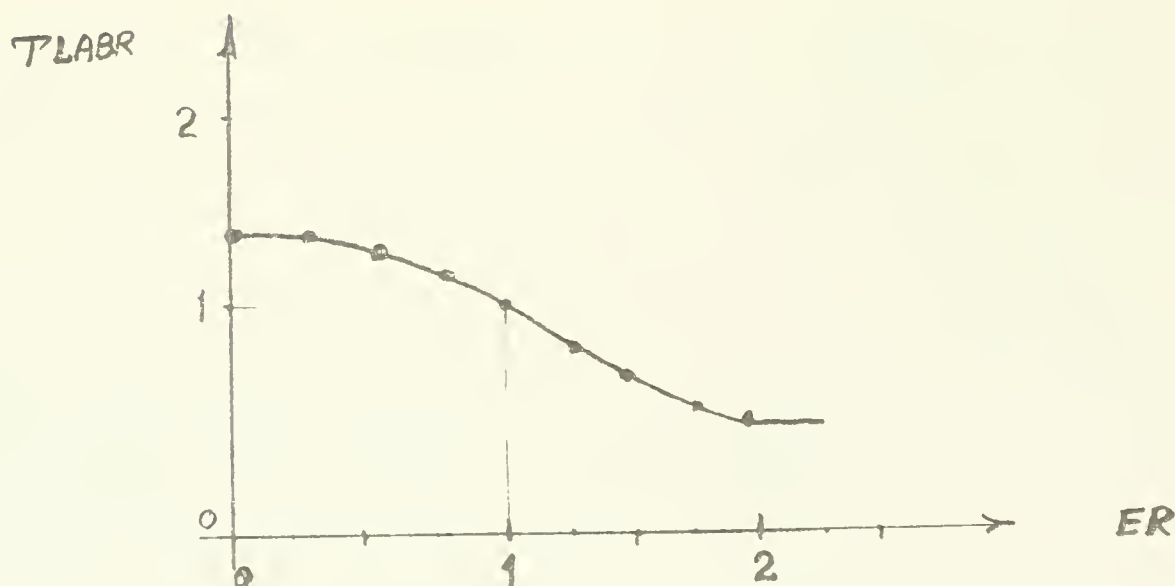


Figure A-8: Effect of Expectancy Ratio on the Likelihood of any Accomplishment Being Rewarded

ER.K=CERW.K/ARWRD.K

28, A

ER - EXPECTANCY RATIO (DIMENSIONLESS)

CERW - COMMUNICATED EXPECTED REWARD (UNITS)

ARWRD - ACCUMULATED REWARDS (UNITS)

Communicated expected reward is a delayed version of the actual expected reward ERW. The expected reward itself is based on the actual level of accomplishment, and is modified by the individual's degree of self-actualization. A conversion factor defines the normal units of rewards that can be expected for each accomplishment unit.

CERW.K=SMOOTH(ERW.K,TCERW) 29, A
CERW - COMMUNICATED EXPECTED REWARD (UNITS)
SMOOTH - A FUNCTION FOR PRODUCING DELAYS OR AVERAGES
ERW - EXPECTED REWARD (UNITS)
TCERW - TIME TO COMMUNICATE EXPECTED REWARD (YEARS)

ERW.K=NERPA*ESAFE.K*ACCOMP.K 30, A
ERW - EXPECTED REWARD (UNITS)
NERPA - NORMAL EXPECTED REWARD PER UNIT OF
ACCOMPLISHMENT
ESAFE - EFFECT OF SELF-ACTUALIZATION ON
EXPECTATIONS (DIMENSIONLESS)
ACCOMP - EXTERNALLY-MOTIVATED ACCOMPLISHMENT (UNITS)

The effect of self-actualization on the expectation of reward is shown in Figure A-9. If a person is fully self-actualized, he will have no expectation for any reward, while if the same person has not reached the self-actualization stage, he not only will perform for reward, but his expectation of reward will also be higher than otherwise. At some "normal" degree of self-actualization (here 40%), the individual will expect a normal acceptable reward for his accomplishment. The table function assumes a value of unity at this point.

ESAFE,K=TABHL(TESAFE,SAF.K/NSAFT,0,2.5,.5)
 TESAFE=1.5/1.3/1/.6/.2/0

31, A
 31.1, T

ESAFE - EFFECT OF SELF-ACTUALIZATION ON
 EXPECTATIONS (DIMENSIONLESS)
 TESAFE - TABLE FOR THE EFFECT OF SELF-ACTUALIZATION
 ON EXPECTATIONS (DIMENSIONLESS)
 SAF - SELF-ACTUALIZATION FRACTION (DIMENSIONLESS)
 NSAFT - NORMAL SELF-ACTUALIZATION TENDENCY
 (DIMENSIONLESS)

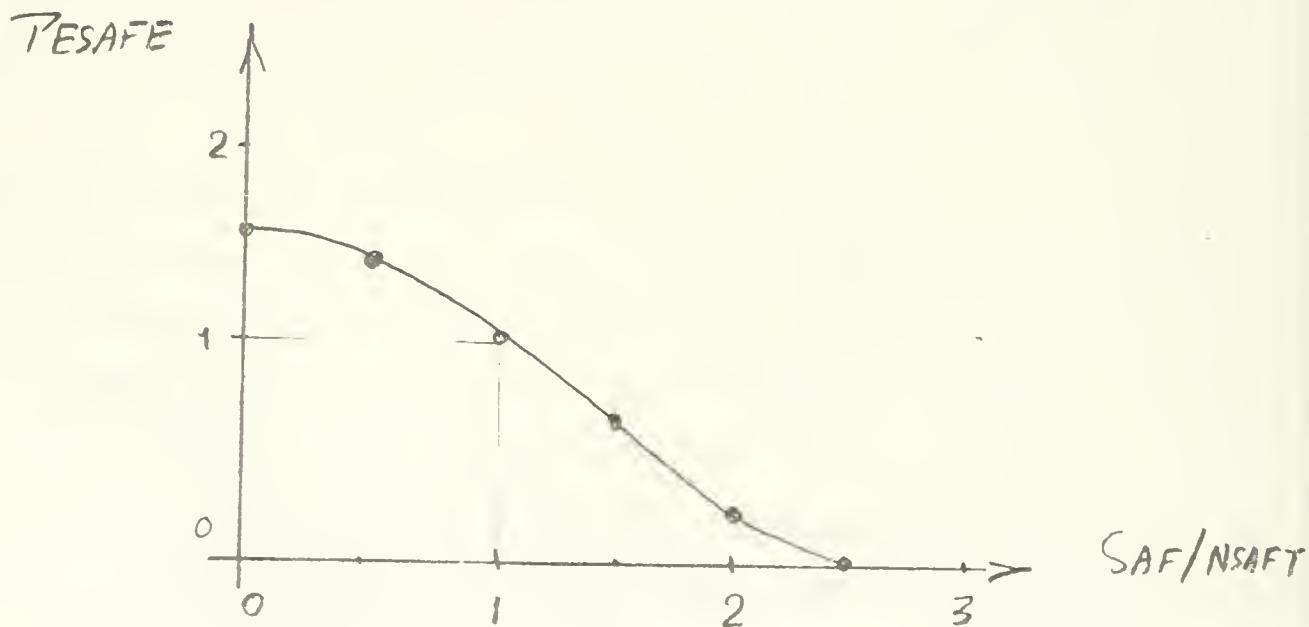


Figure A-9: Effect of Self-actualization on Expectations

II-b. Self-Motivated Desires for Accomplishment

Determinants of self-motivated desires for accomplishment are shown in DYNAMO Flow Diagram II-b. A "normal" individual is assumed to strive for a normal amount of self-motivated accomplishment. But depending on the degree to which the individual has achieved self-actualization, and also on the degree to which he is dissatisfied with excessive accomplishments of the tasks that are externally motivated, he can modify this goal:

SMDA.K=NSMA*ESASMD.K*EDSSMD.K	32, A
NSMA - NORMAL SELF-MOTIVATED ACCOMPLISHMENT	
(UNITS)	
EDSSMD - EFFECT OF DISSATISFACTION WITH "OUTWARD -	
LOOKING" ORIENTATION ON SELF MOTIVATED	
DESIRES FOR ACCOMPLISHMENT	
(DIMENSIONLESS)	

The effect of self-actualization on desire for self-motivated accomplishment is shown in Figure A-10. An individual who succeeds in achieving a high degree of self-actualization expands his normal desires for self-motivated accomplishment. On the other hand, the individual who has no degree of self-actualization has no desire to undertake any self-motivated accomplishments. At some "normal" degree of self-actualization, the individual is assumed to strive for a "normal" amount of self-motivated accomplishment, and hence the table function assumes a value of unity.

ESASMD,K=TABLE(TESA,SAF,K/NSAFT,0,2.5,.5)

33, A

TESA=0/.6/1/1.25/1.35/1.4

33.1, T

TESA - TABLE FOR THE EFFECT OF SELF-ACTUALIZATION
ON SELF-MOTIVATED ACCOMPLISHMENT
(DIMENSIONLESS)

SAF - SELF-ACTUALIZATION FRACTION (DIMENSIONLESS)

NSAFT - NORMAL SELF-ACTUALIZATION TENDENCY
(DIMENSIONLESS)

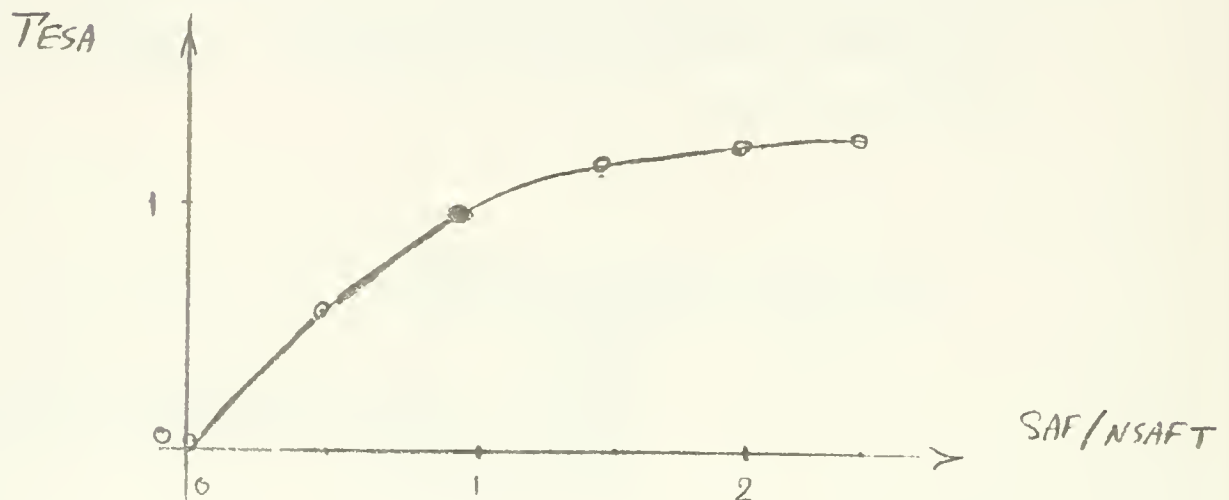


Figure A-10: Effect of Self-actualization on Desires for
Self-motivated Activities

Figure A-11 shows the effect of relative dissatisfaction on desire for self-motivated accomplishment. An individual who is not dissatisfied at all with his "outward-looking" orientation has no reason to desire much self-motivated accomplishment. As dissatisfaction grows, the individual forms more desires for self-motivated accomplishment. Some level of dissatisfaction is assumed to be tolerable for a normal individual, and at that particular level, the effect of dissatisfaction on the formation of desires for self-motivated accomplishment is assumed to be neutral. Beyond this point, and for excessive amounts of dissatisfaction, the individual is assumed to form strong desires to change his "outward-looking" orientation, by more self-motivated accomplishments.

EDSSMD.K=TABHL(TEDSMD,RDIS.K,0,3,.5) 34, A
 TEDSMD=.5/.8/1/1.2/1.5/2/4 34.1, T
 EDSSMD - EFFECT OF DISSATISFACTION WITH "OUTWARD -
 LOOKING" ORIENTATION ON SELF MOTIVATED
 DESIRES FOR ACCOMPLISHMENT
 (DIMENSIONLESS)
 TEDSMD - TABLE FOR THE EFFECT OF DISSATISFACTION ON
 SELF-MOTIVATED DESIRES (DIMENSIONLESS)
 RDIS - RELATIVE DISSATISFACTION (DIMENSIONLESS)

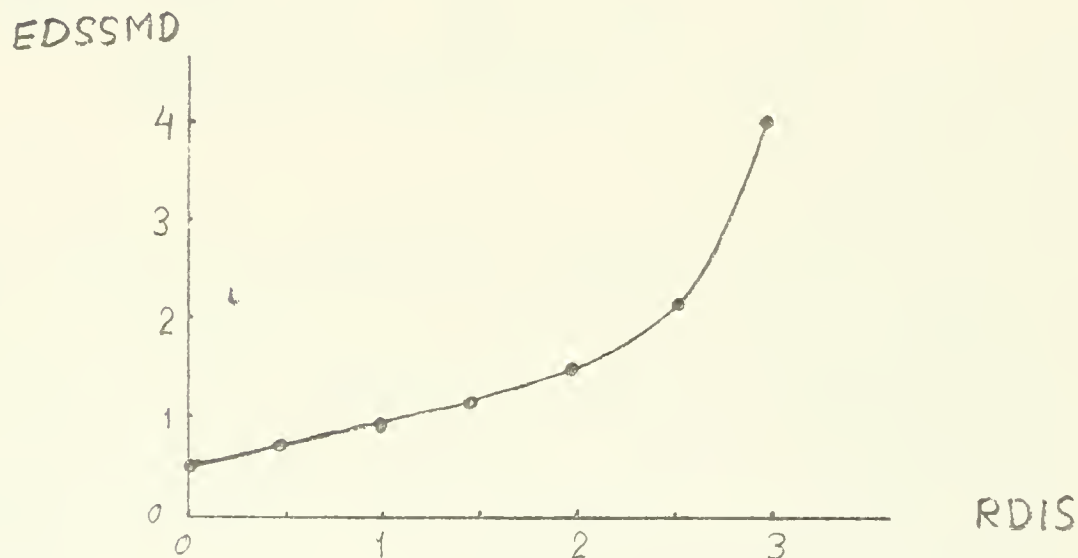


Figure A-11: Effect of Dissatisfaction on Desires for
 Self-motivated Accomplishment

RDIS.K=DISSAT.K/TDISSA 35, A
 RDIS - RELATIVE DISSATISFACTION (DIMENSIONLESS)
 DISSAT - DISSATISFACTION WITH "OUTWARD-LOOKING"
 ORIENTATION (DISSATISFACTION UNITS)
 TDISSA - TOLERABLE DISSATISFACTION (DISSATISFACTION
 UNITS)

Dissatisfaction. Dissatisfaction due to an "outward-looking" orientation is a level. It depends on the past level of dissatisfaction and is changed through the rate at which new dissatisfaction is developed or eliminated.

```
DISSAT.K=DISSAT.J+DT*(DISSCR.JK)          36, L
DISSAT=1                                   36.1, N
    DISSAT - DISSATISFACTION WITH "OUTWARD-LOOKING"
              ORIENTATION (DISSATISFACTION UNITS)
    DT      - COMPUTATIONAL TIME INTERVAL (YEARS)
    DISSCR - DISSATISFACTION CHANGE RATE
              (DISSATISFACTION UNITS/YEAR)
```

The rate of change of dissatisfaction is determined by the fractional change in the existing level of dissatisfaction. This, however, is modified in the event of a paralysis, due to extremely high levels of dissatisfaction. The table function determining this effect is the same as the one used for the effect of paralysis on commitment (Figure A-2) as was shown on page 57.

```
DISSCR.KL=DISSAT.K*FCDISS.K*EPRLSS.K      37, R
    DISSCR - DISSATISFACTION CHANGE RATE
              (DISSATISFACTION UNITS/YEAR)
    DISSAT - DISSATISFACTION WITH "OUTWARD-LOOKING"
              ORIENTATION (DISSATISFACTION UNITS)
    FCDISS - FRACTIONAL CHANGE IN DISSATISFACTION
              (FRACTIONS/YEAR)
    EPRLSS - EFFECT OF PARALYSIS (DIMENSIONLESS)
```

The fractional change in dissatisfaction is the sum of three components, as follows:

FCDISS.K=FCDAD.K+FCDRT.K+FCDN.K 38, A
FCDISS - FRACTIONAL CHANGE IN DISSATISFACTION
(FRACTIONS/YEAR)
FCDAD - FRACTIONAL CHANGE IN DISSATISFACTION DUE TO
ACCOMPLISHMENT DISPARITY (FRACTIONS/
YEAR)
FCDRT - FRACTIONAL CHANGE IN DISSATISFACTION DUE TO
RECENT TREND IN RECEIVING REWARDS
(FRACTIONS/YEAR)
FCDN - FRACTIONAL CHANGE IN DISSATISFACTION DUE TO
THE UNSATISFIED BASIC NEEDS (FRACTIONS/
YEAR)

The fractional change due to accomplishment disparity is determined by the relative accomplishment disparity as shown in Figure A-12. The relative accomplishment disparity is the normalized ratio of self-motivated accomplishment to externally motivated accomplishment. Whenever this ratio is unity, there is no accomplishment disparity and hence no change in the level of dissatisfaction. As the individual accumulates more self-motivated accomplishments, the fractional change in dissatisfaction becomes negative, indicating a decrease in the level of dissatisfaction. On the other hand, the individual who has a relatively small amount of self-motivated accomplishment (RAD small) has a high positive fractional change in his dissatisfaction, indicating sharp rises in the level of dissatisfaction.

FCDAD.K=TABHL(TFCDAD,RAD.K,0,2,.5)

39, A

TFCDAD=2/.5/0/-.5/-.8

39.1, T

FCDAD - FRACTIONAL CHANGE IN DISSATISFACTION DUE TO ACCOMPLISHMENT DISPARITY (FRACTIONS/YEAR)

TFCDAD - TABLE FOR FRACTIONAL CHANGE DUE TO ACCOMPLISHMENT DISPARITY (DIMENSIONLESS)

RAD - RELATIVE ACCOMPLISHMENT DISPARITY (DIMENSIONLESS)

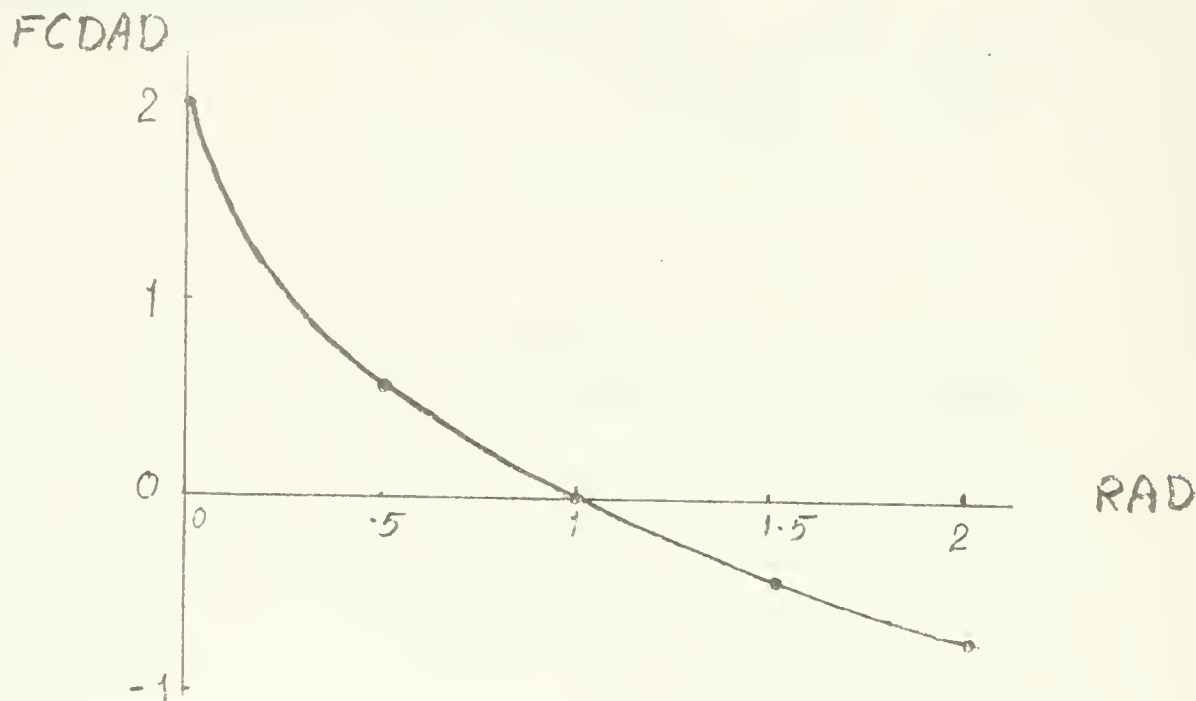


Figure A-12: Effect of Accomplishment Disparity on Dissatisfaction

RAD.K=(SMA.K/ACCOMP.K)/(NSMA/NACMP)

40, A

RAD - RELATIVE ACCOMPLISHMENT DISPARITY (DIMENSIONLESS)

SMA - SELF-MOTIVATED ACCOMPLISHMENT (UNITS)

ACCOMP - EXTERNALLY-MOTIVATED ACCOMPLISHMENT (UNITS)

NSMA - NORMAL SELF-MOTIVATED ACCOMPLISHMENT (UNITS)

NACMP - NORMAL EXTERNALLY-MOTIVATED ACCOMPLISHMENT (UNITS)

The fractional change in the level of dissatisfaction is also determined by the recent trends in the administration of rewards. Such a trend is determined by the ratio of the difference between the short-term average rate of reward to the long-term rate of reward. Thus, a positive trend would show a recent rise in the rate at which rewards are administered. Similarly, a negative trend indicates a recent decline in the rate at which rewards are received. As shown in Figure A-13, a positive trend in the rate at which rewards are received reduces the level of dissatisfaction (fractional change in dissatisfaction due to this factor is negative), while, on the contrary, a declining rate of reward (i.e., a negative trend) produces a positive fractional change in dissatisfaction and thus adds to the individual's level of dissatisfaction due to his "outward-looking" orientation.

$FCDRT.K = TABHL(TFCDRT, RT.K, -1, 1, .5)$ 41, A
 $TFCDRT = .5 / .25 / 0 / -.25 / -.5$ 41.1, T
 FCDRT - FRACTIONAL CHANGE IN DISSATISFACTION DUE TO
 RECENT TREND IN RECEIVING REWARDS
 (FRACTIONS/YEAR)
 TFCDRT - TABLE FOR FRACTIONAL CHANGE IN
 DISSATISFACTION DUE TO RECENT TRENDS IN
 RECEIVING REWARDS (DIMENSIONLESS)
 RT - RECENT TREND IN RECEIVING REWARDS
 (DIMENSIONLESS)

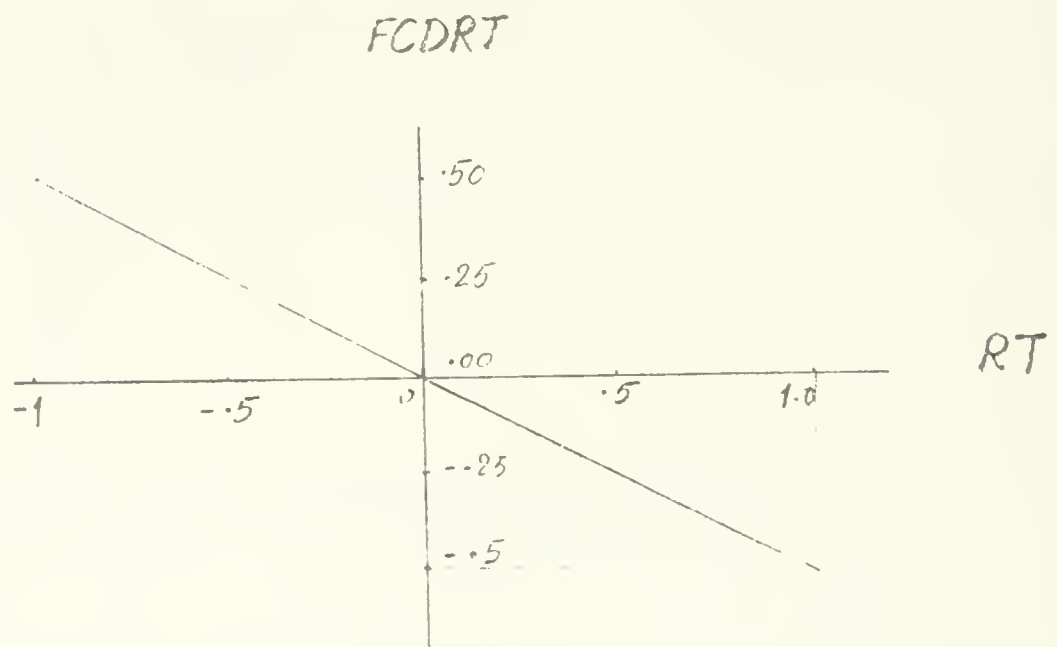


Figure A-13: Effect of Recent Trends in Receiving Rewards on Dissatisfaction

RT.K=(SRARR.K-LRARR.K)/LRARR.K 42, A
 RT - RECENT TREND IN RECEIVING REWARDS
 (DIMENSIONLESS)

SRARR - SHORT-RUN AVERAGE OF REWARD RATE (REWARD
 UNITS /YEAR)

LRARR - LONG-RUN AVERAGE OF REWARD RATE (REWARD
 UNITS /YEAR)

SRARR.K=SMOOTH(RR.JK,TASRR) 43, A
 SRARR - SHORT-RUN AVERAGE OF REWARD RATE (REWARD
 UNITS /YEAR)
 SMOOTH - A FUNCTION FOR PRODUCING DELAYS OR AVERAGES
 RR - REWARD RATE (UNITS/YEAR)
 TASRR - TIME TO AVERAGE SHORT-RUN REWARD
 RATE(YEARS)

LRARR.K=SMOOTH(RR.JK,TALRR) 44, A
 LRARR - LONG-RUN AVERAGE OF REWARD RATE (REWARD
 UNITS /YEAR)
 SMOOTH - A FUNCTION FOR PRODUCING DELAYS OR AVERAGES
 RR - REWARD RATE (UNITS/YEAR)
 TALRR - TIME TO AVERAGE LONG-RUN REWARD RATE (YEAR)

Finally, the need ratio can affect the level of dissatisfaction as shown in Figure A-14. A need ratio of unity (indicating the equality between the unsatisfied basic needs of the individual and his tolerance for such needs) creates no change in the level of dissatisfaction. As the need ratio becomes greater than unity (unsatisfied needs greater than tolerance for needs), the individual becomes discontented with his "outward-looking" orientation (fractional change in dissatisfaction becomes positive). On the other hand, a low need ratio indicating the satisfaction of most basic needs of the individual has the effect of reducing his level of dissatisfaction; thus, the fractional change in dissatisfaction due to this factor becomes negative.

$FCDN.K = TABHL(TFCDN, NR.K, 0, 4, 1)$ 45, A
 $TFCDN = -.5/0/.4/.6/.7$ 45.1, T
 FCDN - FRACTIONAL CHANGE IN DISSATISFACTION DUE TO
 THE UNSATISFIED BASIC NEEDS (FRACTIONS/
 YEAR)
 TFCDN - TABLE FOR FRACTIONAL CHANGE IN
 DISSATISFACTION DUE TO UNSATISFIED BASIC
 NEEDS (DIMENSIONLESS)
 NR - NEED RATIO (DIMENSIONLESS) REWARDED
 (DIMENSIONLESS)

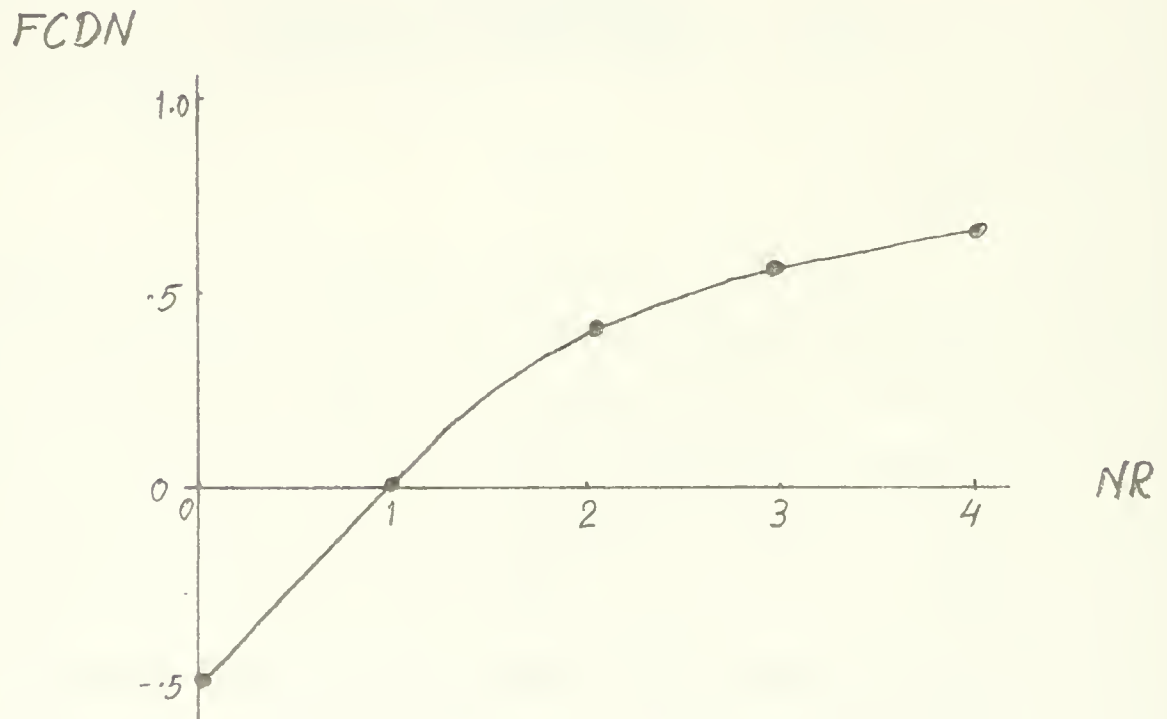


Figure A-14: Effect of Unsatisfied Basic Needs on Dissatisfaction

III. SELF-ACTUALIZATION, NEEDS, AND REWARDS

DYNAMO Flow Diagram III shows the determinants of self-actualization, unsatisfied basic needs, and accumulated rewards. Degree of self-actualization is a level. The change in this level is assumed to depend on the gap between the tendency for self-actualization and the existing degree of self-actualization. An adjustment time indicates the speed with which this gap can be closed.

```

SAF.K=SAF.J+DT*SAFCHR.JK                                46, L
SAF=INSAF                                                46.1, N
  SAF      - SELF-ACTUALIZATION FRACTION (DIMENSIONLESS)
  DT       - COMPUTATIONAL TIME INTERVAL (YEARS)
  SAFCHR   - SELF-ACTUALIZATION CHANGE RATE
              (DIMENSIONLESS)
  INSAF    - INITIAL SELF-ACTUALIZATION FRACTION
              (DIMENSIONLESS)

SAFCHR.KL=(SAFTND.K-SAF.K)/TCSAF                        47, R
  SAFCHR   - SELF-ACTUALIZATION CHANGE RATE
              (DIMENSIONLESS)
  SAFTND   - SELF-ACTUALIZATION TENDENCY (DIMENSIONLESS)
  SAF      - SELF-ACTUALIZATION FRACTION (DIMENSIONLESS)
  TCSAF    - TIME TO ADJUST SELF-ACTUALIZATION (YEARS)

```

The tendency for self-actualization is a function of a normal self-actualization tendency, which is influenced by the need ratio and also by the past self-motivated accomplishments of the individual. When the need ratio is very high, the basic needs of the individual--the needs for food, for shelter, and for safety--are not satisfied. In such

circumstances, the individual has a tendency to depend more on others, rather than progressing toward self-actualization (Figure A-15). On the other hand, as the basic needs are satisfied, the need ratio drops, and the tendency for self-actualization increases.

```
SAFTND.K=NSAFT*ENRSA.K*ESMASA.K          48, A
  SAFTND - SELF-ACTUALIZATION TENDENCY (DIMENSIONLESS)
  NSAFT  - NORMAL SELF-ACTUALIZATION TENDENCY
            (DIMENSIONLESS)
  ENRSA  - EFFECT OF NEED RATIO ON SELF-ACTUALIZATION
            (DIMENSIONLESS)
  ESMASA - EFFECT OF SELF-MOTIVATED ACCOMPLISHMENT ON
            SELF-ACTUALIZATION (DIMENSIONLESS)
```

```
ENRSA.K=TABHL(TENRSA,NR.K,0,6,1)          49, A
TENRSA=1.25/1/.7/.4/.2/.1/0             49.1, T
  ENRSA  - EFFECT OF NEED RATIO ON SELF-ACTUALIZATION
            (DIMENSIONLESS)
  TENRSA - TABLE FOR THE EFFECT OF NEED RATIO ON SELF-
            ACTUALIZATION (DIMENSIONLESS)
  NR     - NEED RATIO (DIMENSIONLESS)REWARDED
            (DIMENSIONLESS)
```

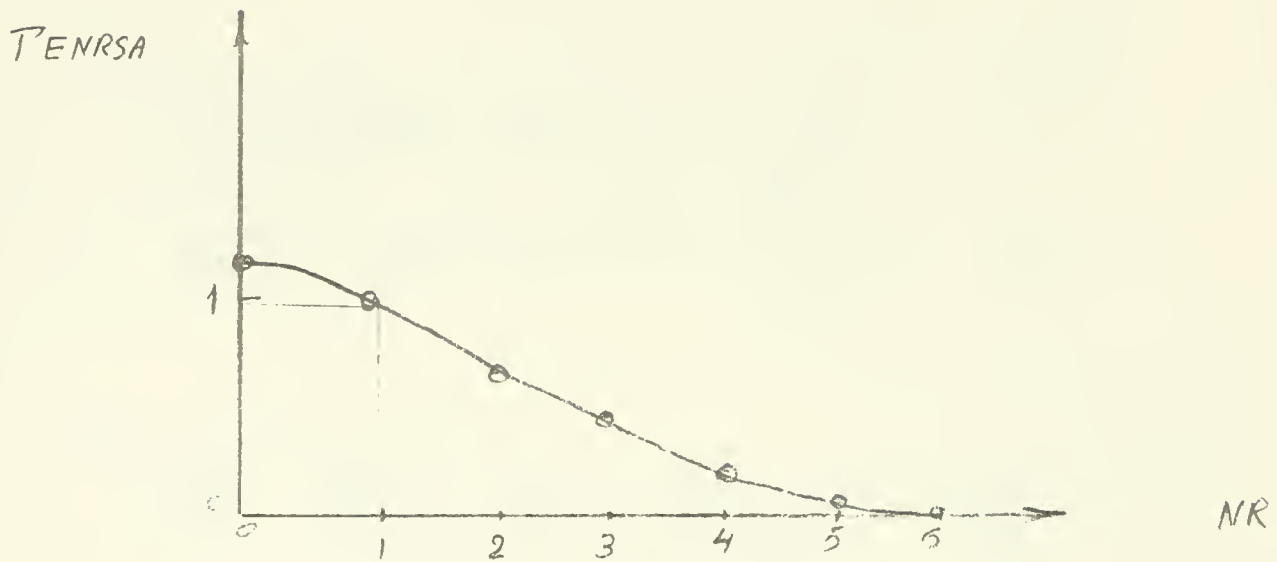


Figure A-15: Effect of Unsatisfied Need-Ratio on the Tendency for Self-Actualization

Of course, to be able to reach self-actualization, the individual should have already engaged in self-motivated activities. This effect is captured in Figure A-16. The individual with no previous self-motivated experience cannot appreciate the value of self-actualization and this exerts downward pressure on the normal tendency for self-actualization. As the individual experiences the fruits of

self-motivated activities, his tendency for self-actualization increases.

ESMASA.K=TABHL(TESMA,SMA,K/NSMA,0,2,.5)

50, A

TESMA=.5/.7/1/1.6/2

50.1, T

ESMASA - EFFECT OF SELF-MOTIVATED ACCOMPLISHMENT ON
SELF-ACTUALIZATION (DIMENSIONLESS)

TESMA - TABLE FOR THE EFFECT OF SELF-MOTIVATED
ACCOMPLISHMENT ON SELF-ACTUALIZATION
(DIMENSIONLESS)

SMA - SELF-MOTIVATED ACCOMPLISHMENT (UNITS)

NSMA - NORMAL SELF-MOTIVATED ACCOMPLISHMENT
(UNITS)

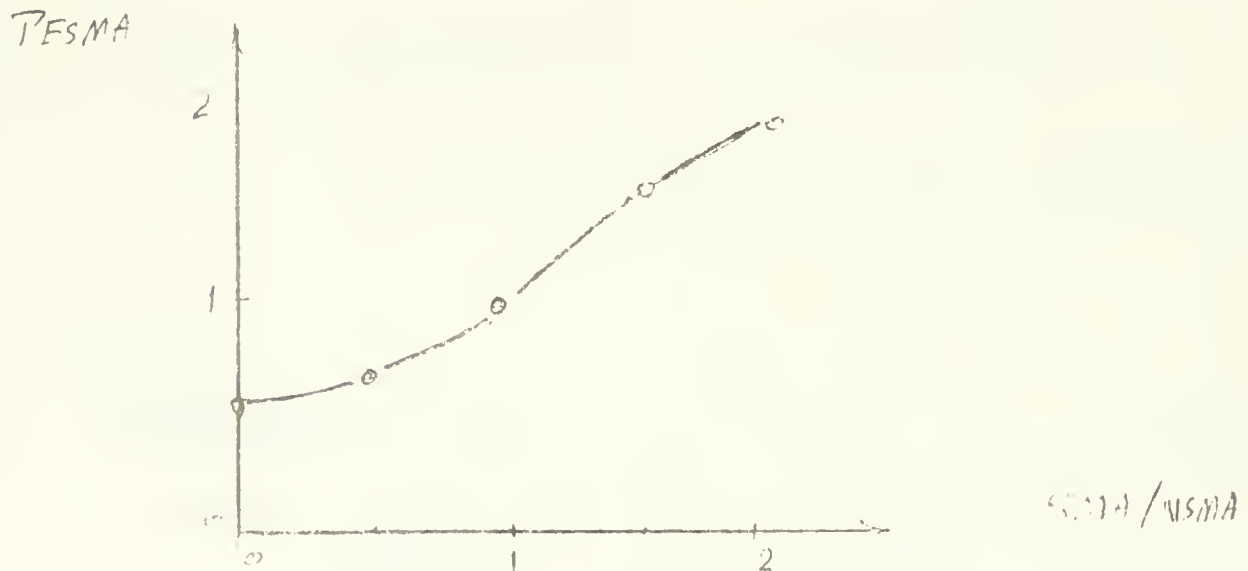


Figure A-16: Effect of Self-motivated Accomplishment on
the Tendency for Self-actualization

Need ratio as defined here is the ratio of unsatisfied
low-order needs of the individual to his level of need tolerance.

NR.K=NEEDS.K/NTOL.K 51, A
NR - NEED RATIO (DIMENSIONLESS)REWARDED
(DIMENSIONLESS)
NEEDS - UNSATISFIED LOW-ORDER NEEDS (UNITS)
NTOL - NEED TOLERANCE (UNITS)

Need tolerance, in turn, depends on some level of basic needs which is determined by human physiology and the environmental or societal setting. This level, however, can vary with the degree of self-actualization in the individual.

NTOL.K=NNEEDS.K*ESANT.K 52, A
NTOL - NEED TOLERANCE (UNITS)
NNEEDS - NORMAL TOLERABLE UNSATISFIED NEEDS (UNITS)
ESANT - EFFECT OF SELF-ACTUALIZATION ON NEED
TOLERANCE (DIMENSIONLESS)

The normal need tolerance is composed of two components--a fixed component determined by the physiology of the individual and the environment in which he lives, along with a variable component which reflects the habit formation process and the fact that with time a person can build up his tolerance to the level of his needs. In reality, both the variable and the constant components of the normal need tolerance are present and hence a mixture of the two is used in the model.

NNEEDS.K=WN*CNEEDS+(1-WN)*ANEEDS.K 53, A

NNEEDS - NORMAL TOLERABLE UNSATISFIED NEEDS (UNITS)

WN - WEIGHING FACTOR (DIMENSIONLESS)

CNEEDS - CONSTANT TOLERANCE FOR UNSATISFIED NEEDS
(UNITS)

ANEEDS - VARIABLE TOLERANCE FOR UNSATISFIED NEEDS
(UNITS)

ANEEDS.K=SMOOTH(NEEDS.K,TANED) 54, A

ANEEDS - VARIABLE TOLERANCE FOR UNSATISFIED NEEDS
(UNITS)

SMOOTH - A FUNCTION FOR PRODUCING DELAYS OR AVERAGES

NEEDS - UNSATISFIED LOW-ORDER NEEDS (UNITS)

TANED - TIME TO AVERAGE NEEDS (YEARS)

The effect of self-actualization on the need tolerance (Figure A-17) is unity at some level of self-actualization. Before a person reaches that level of self-actualization, he has a very low tolerance for needs. He needs whatever he sees. As the individual becomes more self-actualized, his tolerance for needs expands.

ESANT.K=TABHL(TESANT,SAF.K/NSAFT,0,2.5,.5) 55, A

TESANT=.5/.7/1/1.5/1.8/2 55.1, T

ESANT - EFFECT OF SELF-ACTUALIZATION ON NEED
TOLERANCE (DIMENSIONLESS)

TESANT - TABLE FOR THE EFFECT OF SELF-ACTUALIZATION
ON NEED TOLERANCE (DIMENSIONLESS)

SAF - SELF-ACTUALIZATION FRACTION (DIMENSIONLESS)

NSAFT - NORMAL SELF-ACTUALIZATION TENDENCY
(DIMENSIONLESS)

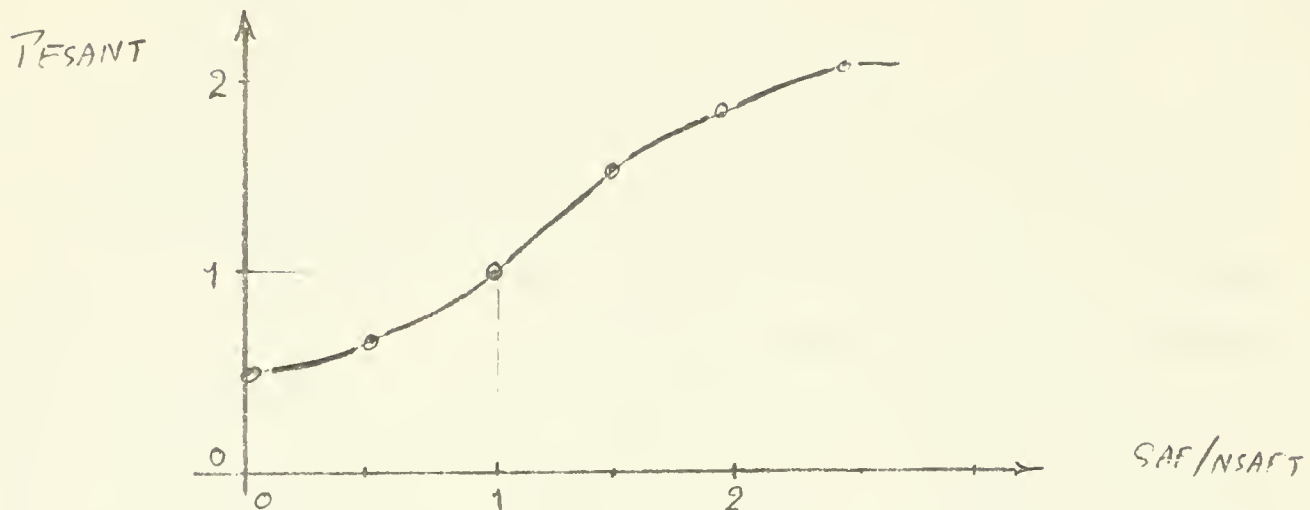


Figure A-17: Effect of Self-actualization on the
Tolerance for Unsatisfied Needs

Needs of the individual is another level in the system. It represents the unsatisfied basic needs that can be fulfilled either through rewards from others or through "autonomous" accomplishment. The unsatisfied need of the individual at any point depends on his needs at a prior point in time, plus the new need that was generated and accepted during the elapsed time interval, minus the needs that were satisfied during the same interval.

$$\text{NEEDS.K} = \text{NEEDS.J} + \text{DT} * (\text{NRR.JK} - \text{NSR.JK})$$

$$\text{NEEDS} = \text{INEEDS}$$

NEEDS - UNSATISFIED LOW-ORDER NEEDS (UNITS)
 DT - COMPUTATIONAL TIME INTERVAL (YEARS)
 NRR - NEED RECOGNITION RATE (UNITS/YEAR)
 NSR - NEED SATISFACTION RATE (UNITS/YEAR)
 INEEDS - INITIAL UNSATISFIED NEEDS (UNITS)

56, L
 56.1, N

The rate of need satisfaction is the sum of the rewards that an individual receives from society for his externally motivated activities, and the rate at which he achieves the self-motivated objectives. A basic need such as a need for shelter can be fulfilled either through working for society and receiving social support for the construction of shelter, or the same can be accomplished by an autonomous and self-motivated effort in construction of the shelter.

A multiplier from the availability of needs to satisfy (Figure A-18) basically states that, if the individual has no needs to satisfy, none can be satisfied. As the needs of the individual rise above the normal level, the excess of needs eases the rate at which they can be satisfied.

```

NSR.KL=(RR.JK+SMAR.JK)*MANTS.K                                57, R
  NSR      - NEED SATISFACTION RATE (UNITS/YEAR)
  RR       - REWARD RATE (UNITS/YEAR)
  SMAR     - SELF-MOTIVATED ACCOMPLISHMENT RATE (UNITS/
              YEAR)
  MANTS    - MULTIPLIER FROM THE AVAILABILITY OF NEEDS
              TO SATISFY (DIMENSIONLESS)

MANTS.K=TABHL(TMAN,NEEDS.K/CNEEDS,0,2,.5)                      58, A
TMAN=0/.25/1/1.6/1.8                                           58.1, T
  MANTS    - MULTIPLIER FROM THE AVAILABILITY OF NEEDS
              TO SATISFY (DIMENSIONLESS)
  TMAN     - TABLE FOR THE MULTIPLIER FROM THE
              AVAILABILITY OF NEEDS TO SATISFY
              (DIMENSIONLESS)
  NEEDS    - UNSATISFIED LOW-ORDER NEEDS (UNITS)
  CNEEDS   - CONSTANT TOLERANCE FOR UNSATISFIED NEEDS
              (UNITS)

```

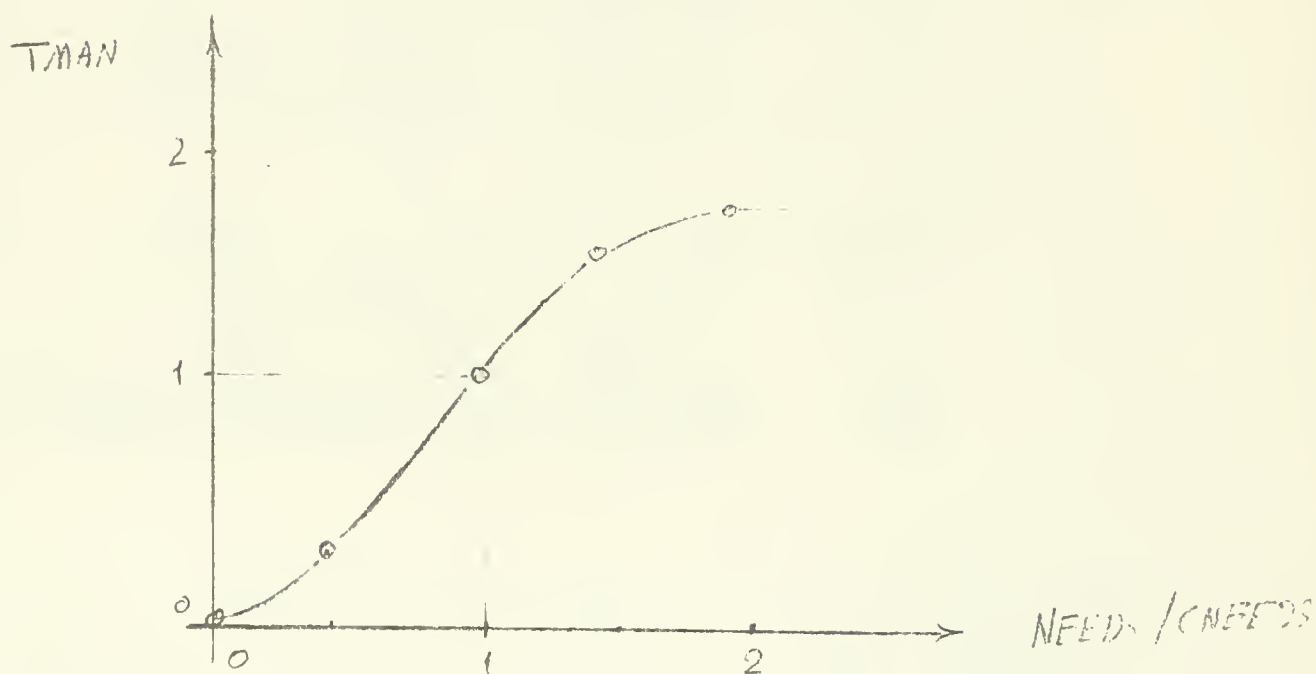


Figure A-18: Effect of Availability of needs on the
Rate of Need Satisfaction

The rate of recognition of needs depends on the rate at which needs are generated within society. The recognition of any generated need is also a function of the self-actualization of the individual (Figure A-19). A fully self-actualized person has more control over his recognition of new needs. A person lacking any degree of

self-actualization, however, is enslaved by society and his recognition of what his basic needs are can even exceed what basic needs society has generated.

$NRR.KL = NGR.K * ESANRR.K$ 59, R
 NRR - NEED RECOGNITION RATE (UNITS/YEAR)
 NGR - NEW NEEDS GENERATED BY THE SOCIETY (UNITS/YEAR)
 ESANRR - EFFECT OF SELF-ACTUALIZATION ON NEED RECOGNITION (DIMENSIONLESS)

 $ESANRR.K = TABHL(TSANRR, SAF.K / NSAFT, 0, 2.5, .5)$ 60, A
 $TSANRR = 1.2 / 1.15 / 1 / .75 / .6 / .4$ 60.1, T
 ESANRR - EFFECT OF SELF-ACTUALIZATION ON NEED RECOGNITION (DIMENSIONLESS)
 TSANRR - TABLE FOR THE EFFECT OF SELF-ACTUALIZATION ON NEED RECOGNITION (DIMENSIONLESS)
 SAF - SELF-ACTUALIZATION FRACTION (DIMENSIONLESS)
 NSAFT - NORMAL SELF-ACTUALIZATION TENDENCY (DIMENSIONLESS)

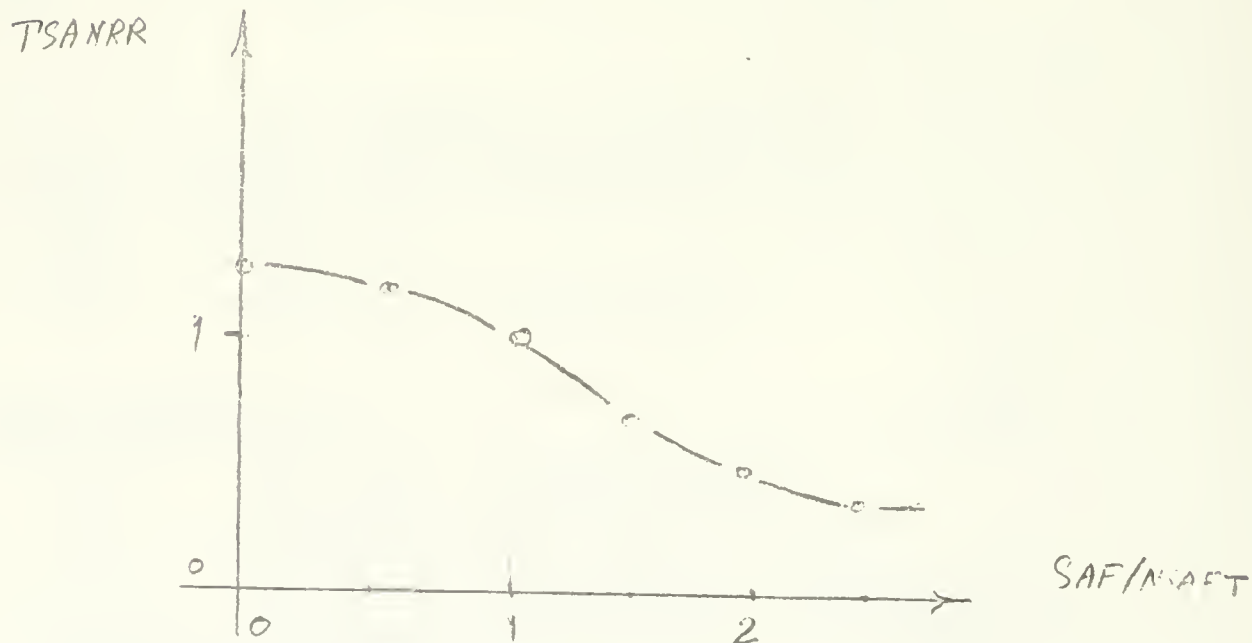


Figure A-19: Effect of Self-actualization on the Recognition of New Needs

The rate of generation of new needs is assumed to be a constant which will be modified by a step function for test purposes.

$NGR.K = NNG * (1 + STEP(NSH, NST))$ 61, A
 NGR - NEW NEEDS GENERATED BY THE SOCIETY (UNITS/
 YEAR)
 NNG - NORMAL NEED GENERATION RATE (UNITS/YEAR)
 STEP - A FUNCTION FOR PRODUCING STEP CHANGES
 NSH - PERCENTAGE STEP CHANGE IN NEED GENERATION
 (DIMENSIONLESS)
 NST - TIME FOR THE OCCURANCE OF THE STEP (YEAR)

REWARDING EQUATIONS

Rewarding Equations. Rewards as referred to here are composed of all that society, or the environment of the individual, can offer to satisfy one or more of the individual's needs. They are all the things that can induce the individual to accomplish something of value to the environment.

Accumulation of rewards at any point in time is a function of past accumulations of rewards, the rates at which new rewards or punishments (negative rewards) are generated, and the rate at which the memory of past rewards is lost or discounted.

```

ARWRD.K=ARWRD.J+DT*(RR.JK-RWRDDR.JK)      62, L
ARWRD=IARWRD                                62.1, N
  ARWRD  - ACCUMULATED REWARDS (UNITS)
  DT      - COMPUTATIONAL TIME INTERVAL (YEARS)
  RR      - REWARD RATE (UNITS/YEAR)
  RWRDDR  - REWARD DISCOUNT RATE (UNITS/YEAR)
  IARWRD  - INITIAL REWARD (UNITS)

```

The rate at which the externally motivated accomplishment of the individual is rewarded is a direct function of the rate at which the individual performs for society. For any new accomplishment a normal reward is administered. This, however, is reduced or increased depending on whether the reward has been recognized as ineffective or effective in the past (Figure A-20). When the accomplishment of the individual equals the rewards he has collected, the ratio of the two becomes unity and the effectiveness is registered as neutral or unity. As accomplishment exceeds rewards, society will perceive the reward as an effective means and will probably expand the rewarding rate to compensate for unrewarded accomplishments. On the other hand, when accomplishment is below the already administered and recognized rewards, the effectiveness of rewarding is in doubt and future rewarding is jeopardized.

```

RR.KL=AACCR.K*NERPA*EFR.K                  63, R
  RR      - REWARD RATE (UNITS/YEAR)
  AACCR   - AVERAGE EXTERNALLY-MOTIVATED ACCOMPLISHMENT
            RATE (UNITS/YEAR)
  NERPA   - NORMAL EXPECTED REWARD PER UNIT OF
            ACCOMPLISHMENT
  EFR     - EFFECTIVENESS OF THE REWARD (DIMENSIONLESS)

```

AACCR.K=SMOOTH(ACCR.JK,TAACCR)

64, A

AACCR=IACMP/ADT

64.1, N

AACCR - AVERAGE EXTERNALLY-MOTIVATED ACCOMPLISHMENT
RATE (UNITS/YEAR)

SMOOTH - A FUNCTION FOR PRODUCING DELAYS OR AVERAGES

ACCR - EXTERNALLY-MOTIVATED ACCOMPLISHMENT RATE
(UNITS/YEAR)

TAACCR - TIME TO AVERAGE ACCOMPLISHMENT RATE (YEARS)

IACMP - INITIAL EXTERNALLY-MOTIVATED ACCOMPLISHMENT
(UNITS)

ADT - AVERAGE DISCOUNT TIME FOR EXTERNALLY-
MOTIVATED ACCOMPLISHMENT (YEARS)

EFR.K=TABHL(TEFR,ACCOMP.K/ARWRD.K,0,2,.25)

65, A

TEFR=0/.2/.4/.7/1/1.3/1.6/1.8/1.9

65.1, T

EFR - EFFECTIVENESS OF THE REWARD (DIMENSIONLESS)

TEFR - TABLE FOR THE EFFECTIVENESS OF THE REWARD
(DIMENSIONLESS)

ACCOMP - EXTERNALLY-MOTIVATED ACCOMPLISHMENT (UNITS)

ARWRD - ACCUMULATED REWARDS (UNITS)



Figure A-20: Effectiveness of Rewards

And finally, the rate at which the memory of any reward is lost is a constant fraction of the recognized reward. This assumes a constant life, on the average, for the significance of any reward.

RWRDDR.KL=ARWRD.K/RWRDDT 66, R
RWRDDR - REWARD DISCOUNT RATE (UNITS/YEAR)
ARWRD - ACCUMULATED REWARDS (UNITS)
RWRDDT - AVERAGE SIGNIFICANT LIFE OF REWARD (YEARS)

This concludes the description of the model equations. A complete listing of the model, and definition of all variables, can be found in the next appendix.

Externally
Motivated
Desires

RUDE

Relative
Unrealized
Desires for
Externally
Motivated
Accomplishments

FAC

ACCR
Accomp.
RateACCOMP
Externally
Motivated
AccomplishmentADR
Accomp.
Discount
Rate

EPEMA

Effect of
Past ExperienceACOMIT
Additions
to
CommitmentsCOMITE
Commit-
ments
to
External
Motivated
ActsWCOMIT
Withdrawal
of Commit.Actual Capabilities
Used for Externally
Motivated Activities

ACUEA

Actual Capabilities

ACAP

Effect of
Paralysis

EPRLSS

Dissatisfaction

ODISSAT

ACUSA

EPSMA

Effect of Past
Self-motivated
Experience

FWC

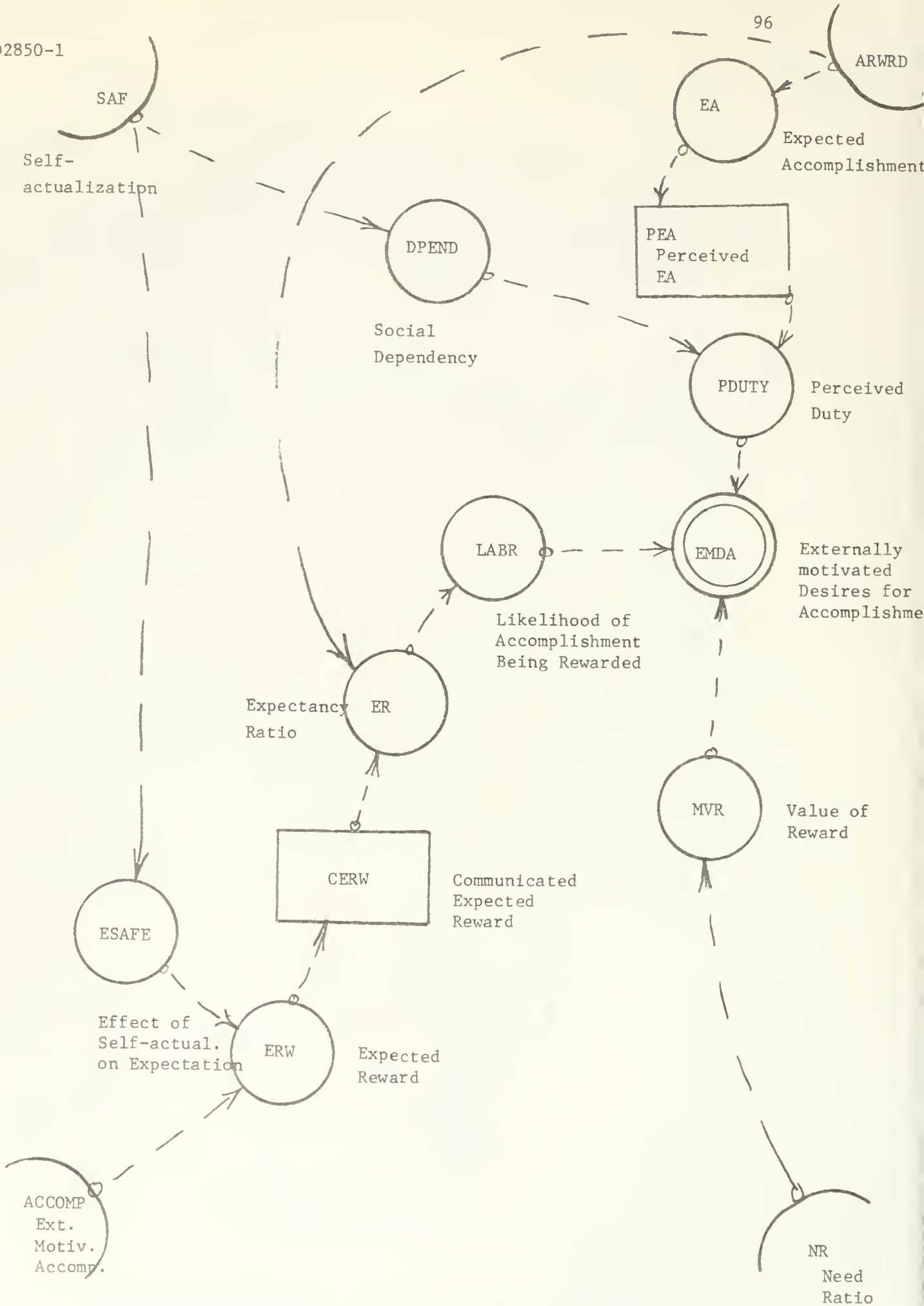
SMA
Self-motivated
AccomplishmentSMAR
Self-
motivat
Accomp.
RateSMADR
S.M.A.
Discount
Rate

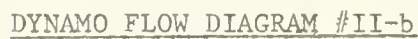
RUDS

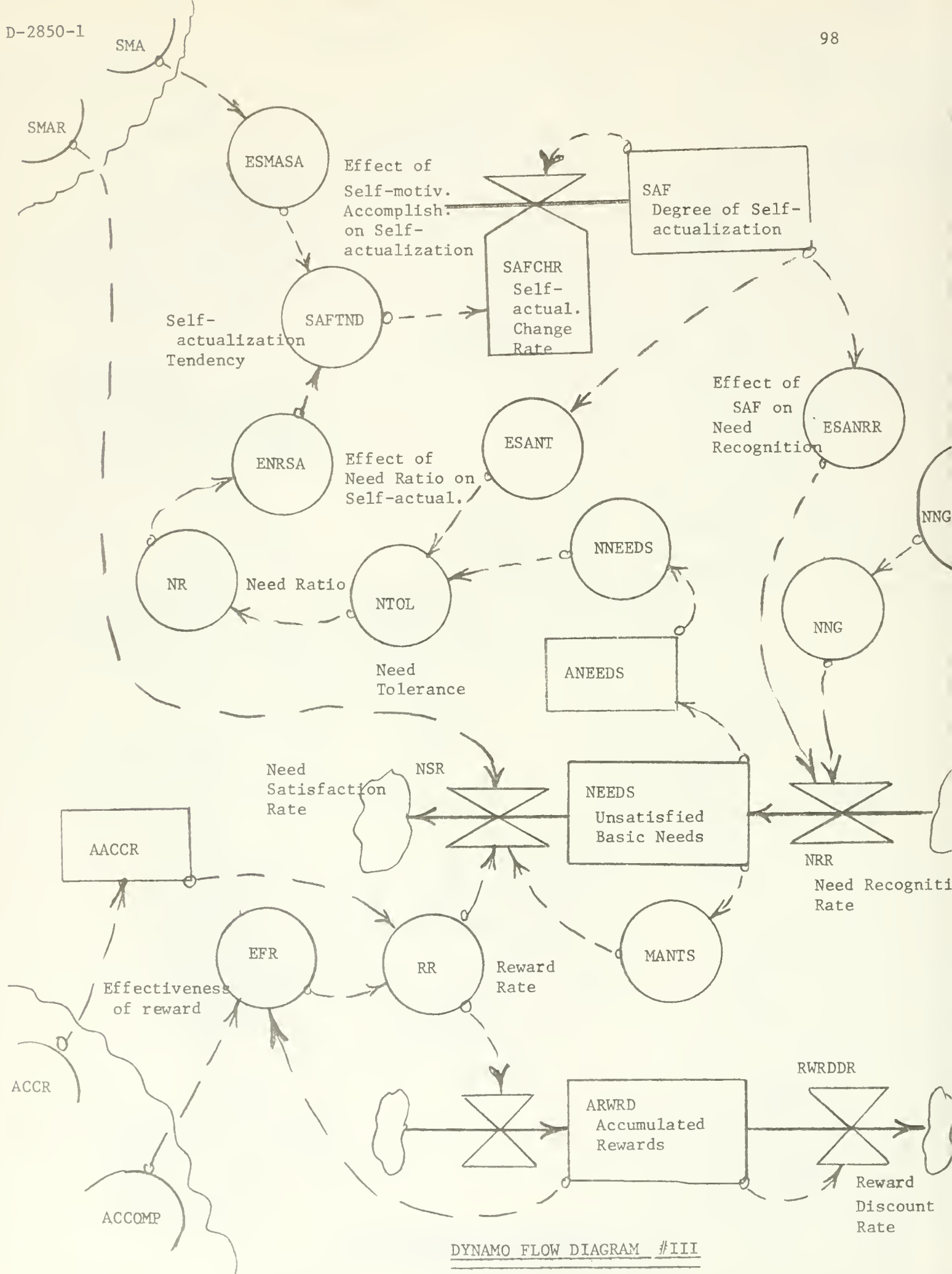
Relative
Unrealized Desires
for Self-motivated
Accomplishments

SMDA

Self-
motivated
DesiresDYNAMO FLOW DIAGRAM #1







DYNAMO FLOW DIAGRAM #III

APPENDIX BEQUATION LISTING

```

00001 NOTE
00002 NOTE *****
00003 NOTE
00004 NOTE          ACHIEVEMENT CRISIS
00005 NOTE          HOMAYOON E. DABIRI
00006 NOTE          JULY 1978 SSM , MIT
00007 NOTE
00008 NOTE *****
00009 NOTE
00011 NOTE          ACCOMPLISHMENT EQUATIONS
00012 NOTE
00013 NOTE A)          EXTERNALLY-MOTIVATED ACCOMPLISHMENT
00014 NOTE
10020 L  ACCOMP.K=ACCOMP.J+DT*(ACCR.JK-ADR.JK)
10021 N  ACCOMP=IACMP
10030 R  ADR.KL=ACCOMP.K/ADT
10040 R  ACCR.KL=EPEMA.K*ACUEA.K
10050 A  EPEMA.K=TABHL(TEPEMA,ACCOMP.K/NACMP,0,2,.5)
10051 T  TEPEMA=.3/.7/1/1.2/1.3
10060 A  ACUEA.K=MIN(COMITE.K,ACAP.K)
10070 A  ACAP.K=NCAP*EPRLS.K
10080 A  EPRLS.K=TABHL(TEPRLS,DISSAT.K/LIMIT,0,1,.25)
10081 T  TEPRLS=1/1/.8/.5/0
10082 N  LIMIT=50*TDISSA
10090 L  COMITE.K=COMITE.J+DT*(ACOMIT.JK-WCOMIT.JK)
10091 N  COMITE=ICOMIT
10100 R  ACOMIT.KL=COMITE.K*FAC.K
10110 A  FAC.K=NFAC*TABHL(TFAC,RUDE.K,0,4,1)
10111 T  TFAC=0/.2/.5/.8/1
10120 A  RUDE.K=(EMDA.K-ACCOMP.K)/NACMP
10130 R  WCOMIT.KL=COMITE.K*FWC.K
10140 A  FWC.K=NFWC*TABHL(TFWC,RUDS.K,0,4,1)
10141 T  TFWC=0/.2/.5/.8/1
10150 A  RUDS.K=(SMDA.K-SMA.K)/NSMA
10151 NOTE
10152 NOTE B)          SELF-MOTIVATED ACCOMPLISHMENT
10153 NOTE
10160 L  SMA.K=SMA.J+DT*(SMAR.JK-SMADR.JK)
10161 N  SMA=ISMA
10170 R  SMADR.KL=SMA.K/ADTSMA
10180 R  SMAR.KL=EPSMA.K*ACUSA.K
10190 A  EPSMA.K=TABHL(TEPSMA,SMA.K/NSMA,0,2,.5)
10191 T  TEPSMA=.3/.7/1/1.2/1.3
10200 A  ACUSA.K=ACAP.K-ACUEA.K

```

```

10201 NOTE
10202 NOTE          DESIRES FOR ACCOMPLISHMENT
10203 NOTE
10204 NOTE  A)      EXTERNALLY-MOTIVATED DESIRES
10205 NOTE
10210 A  EMDA.K=PDUTY.K*MVR.K*LABR.K
10220 A  PDUTY.K=PEA.K*DPEND.K
10230 A  PEA.K=SMOOTH(EA.K,TPEA)
10240 A  EA.K=NEAPUR*ARWRD.K
10250 A  DPEND.K=TABHL(TDPEND,SAF.K/NSAFT,0,3,.5)
10251 T  TDPEND=1.3/1.2/1/.7/.5/.4/.3
10260 A  MVR.K=TABHL(TMVR,NR.K,0,3,.5)
10261 T  TMVR=.3/.6/1/1.4/1.7/1.9/2
10270 A  LABR.K=TABHL(TLABR,ER.K,0,2,.25)
10271 T  TLABR=1.3/1.25/1.2/1.15/1/.85/.7/.6/.5
10280 A  ER.K=CERW.K/ARWRD.K
10290 A  CERW.K=SMOOTH(ERW.K,TCERW)
10300 A  ERW.K=NERPA*ESAFE.K*ACCOMP.K
10310 A  ESAFE.K=TABHL(TESAFE,SAF.K/NSAFT,0,2.5,.5)
10311 T  TESAfe=1.5/1.3/1/.6/.2/0
10312 NOTE
10313 NOTE  B)      SELF-MOTIVATED DESIRES
10314 NOTE
10320 A  SMDA.K=NSMA*ESASMD.K*EDSSMD.K
10330 A  ESASMD.K=TABHL(TESA,SAF.K/NSAFT,0,2.5,.5)
10331 T  TESA=0/.6/1/1.25/1.35/1.4
10340 A  EDSSMD.K=TABHL(TEDSMD,RDIS.K,0,3,.5)
10341 T  TEDSMD=.5/.8/1/1.2/1.5/2/4
10350 A  RDIS.K=DISSAT.K/TDISSA
10351 NOTE
10352 NOTE  DISSATISFACTION
10353 NOTE
10360 L  DISSAT.K=DISSAT.J+DT*(DISSCR.JK)
10361 N  DISSAT=1
10370 R  DISSCR.KL=DISSAT.K*FCDISS.K*EPRLSS.K
10380 A  FCDISS.K=FCDAD.K+FCDRT.K+FCDN.K
10390 A  FCDAD.K=TABHL(TFCDAD,RAD.K,0,2,.5)
10391 T  TFCDAD=2/.5/0/-.5/-.8
10400 A  RAD.K=(SMA.K/ACCOMP.K)/(NSMA/NACMP)
10410 A  FCDRT.K=TABHL(TFCDRT,RT.K,-1,1,.5)
10411 T  TFCDRT=.5/.25/0/-.25/-.5
10420 A  RT.K=(SRARR.K-LRARR.K)/LRARR.K
10430 A  SRARR.K=SMOOTH(RR.JK,TASRR)
10440 A  LRARR.K=SMOOTH(RR.JK,TALRR)
10450 A  FCDN.K=TABHL(TFCDN,NR.K,0,4,1)
10451 T  TFCDN=-.5/0/.4/.6/.7

```

```

10452 NOTE
10453 NOTE SELF-ACTUALIZATION, NEEDS AND REWARDS
10454 NOTE
10460 L SAF.K=SAF.J+DT*SAFCHR.JK
10461 N SAF=INSAF
10470 R SAFCHR.KL=(SAFTND.K-SAF.K)/TCSAF
10480 A SAFTND.K=NSAFT*ENRSA.K*ESMASA.K
10490 A ENRSA.K=TABHL(TENRSA,NR.K,0,6,1)
10491 T TENRSA=1.25/1/.7/.4/.2/.1/0
10500 A ESMASA.K=TABHL(TESMA,SMA.K/NSMA,0,2,.5)
10501 T TESMA=.5/.7/1/1.6/2
10510 A NR.K=NEEDS.K/NTOL.K
10520 A NTOL.K=NNEEDS.K*ESANT.K
10530 A NNEEDS.K=WN*CNEEDS+(1-WN)*ANEEDS.K
10540 A ANEEDS.K=SMOOTH(NEEDS.K,TANEEED)
10550 A ESANT.K=TABHL(TESANT,SAF.K/NSAFT,0,2.5,.5)
10551 T TESANT=.5/.7/1/1.5/1.8/2
10560 L NEEDS.K=NEEDS.J+DT*(NRR.JK-NSR.JK)
10561 N NEEDS=INEEDS
10570 R NSR.KL=(RR.JK+SMAR.JK)*MANTS.K
10580 A MANTS.K=TABHL(TMAN,NEEDS.K/CNEEDS,0,2,.5)
10581 T TMAN=0/.25/1/1.6/1.8
10590 R NRR.KL=NGR.K*ESANRR.K
10600 A ESANRR.K=TABHL(TSANRR,SAF.K/NSAFT,0,2.5,.5)
10601 T TSANRR=1.2/1.15/1/.75/.6/.4
10610 A NGR.K=NNG*(1+STEP(NSH,NST))
10611 NOTE
10612 NOTE REWARDING EQUATIONS
10613 NOTE
10620 L ARWRD.K=ARWRD.J+DT*(RR.JK-RWRDDR.JK)
10621 N ARWRD=IARWRD
10630 R RR.KL=AACCR.K*NERPA*EFR.K
10640 A AACCR.K=SMOOTH(ACCR.JK,TAACCR)
10641 N AACCR=IACMP/ADT
10650 A EFR.K=TABHL(TEFR,ACCOMP.K/ARWRD.K,0,2,.25)
10651 T TEFR=0/.2/.4/.7/1/1.3/1.6/1.8/1.9
10660 R RWRDDR.KL=ARWRD.K/RWRDDT

```

10661 NOTE
10662 NOTE INITIAL CONDITIONS AND CONSTANTS
10663 NOTE
10664 C ADT=10
10665 C ADTSMA=10
10666 C CNEEDS=25
10667 C IACMP=5
10668 C IARWRD=5
10669 C ICOMIT=5
10671 C INEEDS=50
10672 C ISMA=5
10673 C INSAF=.2
10674 C NACMP=40
10675 C NCAF=10
10676 C NFAC=.2/NFWC=.2
10677 C NNG=10
10678 C NSH=0/NST=18
10679 C NSAFT=.4
10681 C NSMA=40
10682 C NEAPUR=1
10683 C NERPA=1
10684 C RWRDDT=10
10685 C TAACCR=5
10686 C TANEED=5
10687 C TALRR=10/TASRR=1
10688 C TDISSA=200
10689 C TPEA=2
10691 C TCERW=1
10692 C TCSAF=10
10693 C WN=.5
10694 NOTE
10695 NOTE CONTROL EQUATIONS
10696 NOTE
10697 SPEC DT=.125/LENGTH=0/PLTPER=2/PRTPER=0
10698 PLOT ACCOMP=*/SMA=S/DISSAT
10699 PLOT ACCOMP=*,SMA=S/EMDA=E/ACCR=1/SMAR=3,AACCR=4
10701 PLOT RAD=R/COMITE=C/ACOMIT=A,WCOMIT=W/FAC,FWC/RUDE,RUDS
10702 PLOT DISSAT/FCDISS,FCDDAD,FCDDRT,FCDDN/RT/RAD/NR
10703 PLOT EMDA=D,PDUTY=R,ARWRD=W/MVR=V,LABR=L/ER=A/COMITE=C
10704 PLOT NEEDS=N,NTOL=T/NR=R/ACCOMP=*,ERW=X,CERW=C,ARWRD=B/NRR=1/N
10705 PLOT DPEND=D/SAFTND=C,SAF=S
10706 PRINT ACCOMP,EMDA,ACCR,SMA,RR,ARWRD,SAF,SAFTND,NR,NEEDS,NTOL
10707 RUN

APPENDIX C:VARIABLE DEFINITION

<u>NAME</u>	<u>NO</u>	<u>T</u>	<u>DEFINITION</u>
AACCR	64	A	AVERAGE EXTERNALLY-MOTIVATED ACCOMPLISHMENT
	64.1	N	RATE (UNITS/YEAR)
ACAP	7	A	ACTUAL CAPABILITIES (ACCOMPLISHMENT UNITS/YEAR)
ACCOMP	2	L	EXTERNALLY-MOTIVATED ACCOMPLISHMENT (UNITS)
	2.1	N	
ACCR	4	R	EXTERNALLY-MOTIVATED ACCOMPLISHMENT RATE (UNITS/YEAR)
ACOMIT	10	R	ADDITIONS OF COMMITMENTS TO EXTERNALLY MOTIVATED ACTIVITIES (ACCOMPLISHMENT UNITS/YEAR/YEAR)
ACUEA	6	A	ACTUAL CAPABILITIES USED IN EXTERNALLY-MOTIVATED ACTIVITIES (ACCOMPLISHMENT UNITS/YEAR)
ACUSA	20	A	ACTUAL CAPABILITIES USED FOR SELF-MOTIVATED ACTIVITIES (ACCOMPLISHMENT UNITS/YEAR)
ADR	3	R	ACCOMPLISHMENT DISCOUNT RATE (UNITS/YEAR)
ADT	66.4	C	AVERAGE DISCOUNT TIME FOR EXTERNALLY-MOTIVATED ACCOMPLISHMENT (YEARS)
ADTSMA	66.5	C	AVERAGE DISCOUNT TIME FOR SELF-MOTIVATED ACCOMPLISHMENT (YEARS)
ANEEDS	54	A	VARIABLE TOLERANCE FOR UNSATISFIED NEEDS (UNITS)
ARWRD	62	L	ACCUMULATED REWARDS (UNITS)
	62.1	N	
CERW	29	A	COMMUNICATED EXPECTED REWARD (UNITS)
CNEEDS	66.6	C	CONSTANT TOLERANCE FOR UNSATISFIED NEEDS (UNITS)
COMITE	9	L	COMMITMENT OF CAPABILITIES TO EXTERNALLY
	9.1	N	MOTIVATED ACTIVITIES (ACCOMPLISHMENT UNITS/YEAR)
DISSAT	36	L	DISSATISFACTION WITH "OUTWARD-LOOKING"
	36.1	N	ORIENTATION (DISSATISFACTION UNITS)
DISSCR	37	R	DISSATISFACTION CHANGE RATE (DISSATISFACTION UNITS/YEAR)
DPEND	25	A	DEPENDENCY FACTOR (DIMENSIONLESS)
DT			COMPUTATIONAL TIME INTERVAL (YEARS)

EA	24	A	EXPECTED ACCOMPLISHMENT (UNITS)
EDSSMD	34	A	EFFECT OF DISSATISFACTION WITH "OUTWARD - LOOKING" ORIENTATION ON SELF MOTIVATED DESIRES FOR ACCOMPLISHMENT (DIMENSIONLESS)
EFR	65	A	EFFECTIVENESS OF THE REWARD (DIMENSIONLESS)
EMDA	21	A	EXTERNALLY MOTIVATED DESIRES FOR ACCOMPLISHMENT (UNITS)
ENRSA	49	A	EFFECT OF NEED RATIO ON SELF-ACTUALIZATION (DIMENSIONLESS)
EPEMA	5	A	EFFECT OF PAST EXTERNALLY-MOTIVATED ACTIVITIES ON THE CAPABILITY FOR SUCH ACTS (DIMENSIONLESS)
EPRLSS	8	A	EFFECT OF PARALYSIS (DIMENSIONLESS)
EPSMA	19	A	EFFECT OF PAST SELF-MOTIVATED ACTIVITIES ON THE CAPABILITY FOR SUCH ACTS (DIMENSIONLESS)
ER	28	A	EXPECTANCY RATIO (DIMENSIONLESS)
ERW	30	A	EXPECTED REWARD (UNITS)
ESAFE	31	A	EFFECT OF SELF-ACTUALIZATION ON EXPECTATIONS (DIMENSIONLESS)
ESANRR	60	A	EFFECT OF SELF-ACTUALIZATION ON NEED RECOGNITION (DIMENSIONLESS)
ESANT	55	A	EFFECT OF SELF-ACTUALIZATION ON NEED TOLERANCE (DIMENSIONLESS)
ESASMD	33	A	
ESMASA	50	A	EFFECT OF SELF-MOTIVATED ACCOMPLISHMENT ON SELF-ACTUALIZATION (DIMENSIONLESS)
FAC	11	A	FRACTIONAL ADDITIONS OF COMMITMENTS TO EXTERNALLY-MOTIVATED ACTIVITIES (FRACTIONS/YEAR)
FCDAD	39	A	FRACTIONAL CHANGE IN DISSATISFACTION DUE TO ACCOMPLISHMENT DISPARITY (FRACTIONS/ YEAR)
FCDISS	38	A	FRACTIONAL CHANGE IN DISSATISFACTION (FRACTIONS/YEAR)
FCDN	45	A	FRACTIONAL CHANGE IN DISSATISFACTION DUE TO THE UNSATISFIED BASIC NEEDS (FRACTIONS/ YEAR)
FCDRT	41	A	FRACTIONAL CHANGE IN DISSATISFACTION DUE TO RECENT TREND IN RECEIVING REWARDS (FRACTIONS/YEAR)
FWC	14	A	FRACTIONAL WITHDRAWAL OF COMMITMENTS FROM EXTERNALLY-MOTIVATED ACTIVITIES (FRACTIONS/YEAR)
IACMP	66.7	C	INITIAL EXTERNALLY-MOTIVATED ACCOMPLISHMENT (UNITS)
IARWRD	66.8	C	INITIAL REWARD (UNITS)
ICOMIT	66.9	C	INITIAL COMMITMENT (COMMITMENT UNITS)
INEEDS	67.1	C	INITIAL UNSATISFIED NEEDS (UNITS)
INSAF	67.3	C	INITIAL SELF-ACTUALIZATION FRACTION (DIMENSIONLESS)

ISMA	67.2	C	INITIAL SELF-MOTIVATED ACCOMPLISHMENT (DIMENSIONLESS)
LABR	27	A	LIKELIHOOD OF ANY ACCOMPLISHMENT BEING REWARDED (DIMENSIONLESS)
LENGTH LIMIT	8.2	N	AN UPPER LIMIT ON BEARABLE DISSATISFACTION (DISSATISFACTION UNITS)
LRARR	44	A	LONG-RUN AVERAGE OF REWARD RATE (REWARD UNITS /YEAR)
MANTS	58	A	MULTIPLIER FROM THE AVAILABILITY OF NEEDS TO SATISFY (DIMENSIONLESS)
MVR	26	A	MULTIPLIER FOR THE VALUE OF REWARD (DIMENSIONLESS)(DIMENSIONLESS)
NACMP	67.4	C	NORMAL EXTERNALLY-MOTIVATED ACCOMPLISHMENT (UNITS)
NCAP	67.5	C	NATURAL CAPABILITIES (ACCOMPLISHMENT UNITS/ YEAR)
NEAPUR	68.2	C	NORMAL EXPECTED ACCOMPLISHMENT PER UNITS OF REWARD
NEEDS	56	L	UNSATISFIED LOW-ORDER NEEDS (UNITS)
	56.1	N	
NERPA	68.3	C	NORMAL EXPECTED REWARD PER UNIT OF ACCOMPLISHMENT
NFAC	67.6	C	NORMAL FRACTIONAL ADDITIONS OF COMMITMENTS TO EXTERNALLY-MOTIVATED ACTIVITIES (FRACTIONS/YEAR)
NFWC			NORMAL FRACTIONAL WITHDRAWAL OF COMMITMENTS FROM EXTERNALLY-MOTIVATED ACTIVITIES (FRACTIONS/YEAR)
NGR	61	A	NEW NEEDS GENERATED BY THE SOCIETY (UNITS/ YEAR)
NNEEDS	53	A	NORMAL TOLERABLE UNSATISFIED NEEDS (UNITS)
NNG	67.7	C	NORMAL NEED GENERATION RATE (UNITS/YEAR)
NR	51	A	NEED RATIO (DIMENSIONLESS)REWARDED (DIMENSIONLESS)
NRR	59	R	NEED RECOGNITION RATE (UNITS/YEAR)
NSAFT	67.9	C	NORMAL SELF-ACTUALIZATION TENDENCY (DIMENSIONLESS)
NSH	67.8	C	PERCENTAGE STEP CHANGE IN NEED GENERATION (DIMENSIONLESS)
NSMA	68.1	C	NORMAL SELF-MOTIVATED ACCOMPLISHMENT (UNITS)
NSR	57	R	NEED SATISFACTION RATE (UNITS/YEAR)
NST			TIME FOR THE OCCURANCE OF THE STEP (YEAR)
NTOL	52	A	NEED TOLERANCE (UNITS)
PDUTY	22	A	PERCEIVED DUTY (ACCOMPLISHMENT UNITS)
PEA	23	A	PERCEIVED EXPECTED ACCOMPLISHMENT (UNITS)
PLTPER			

PRTPER			
RAD	40	A	RELATIVE ACCOMPLISHMENT DISPARITY (DIMENSIONLESS)
RDIS	35	A	RELATIVE DISSATISFACTION (DIMENSIONLESS)
RR	63	R	REWARD RATE (UNITS/YEAR)
RT	42	A	RECENT TREND IN RECEIVING REWARDS (DIMENSIONLESS)
RUDE	12	A	RELATIVE UNSATISFIED DESIRES FOR EXTERNALLY-MOTIVATED ACTIVITIES (DIMENSIONLESS)
RUDS	15	A	RELATIVE UNSATISFIED DESIRES FOR SELF- MOTIVATED ACTIVITIES (DIMENSIONLESS)
RWRDDR	66	R	REWARD DISCOUNT RATE (UNITS/YEAR)
RWRDDT	68.4	C	AVERAGE SIGNIFICANT LIFE OF REWARD (YEARS)
SAF	46	L	SELF-ACTUALIZATION FRACTION (DIMENSIONLESS)
	46.1	N	
SAFCHR	47	R	SELF-ACTUALIZATION CHANGE RATE (DIMENSIONLESS)
SAFTND	48	A	SELF-ACTUALIZATION TENDENCY (DIMENSIONLESS)
SMA	16	L	SELF-MOTIVATED ACCOMPLISHMENT (UNITS)
	16.1	N	
SMADR	17	R	SELF-MOTIVATED ACCOMPLISHMENT DISCOUNT RATE (UNITS/YEAR)
SMAR	18	R	SELF-MOTIVATED ACCOMPLISHMENT RATE (UNITS/ YEAR)
SMDA	32	A	
SMOOTH			A FUNCTION FOR PRODUCING DELAYS OR AVERAGES
SRARR	43	A	SHORT-RUN AVERAGE OF REWARD RATE (REWARD UNITS /YEAR)
STEP			A FUNCTION FOR PRODUCING STEP CHANGES
TAACCR	68.5	C	TIME TO AVERAGE ACCOMPLISHMENT RATE (YEARS)
TALRR	68.7	C	TIME TO AVERAGE LONG-RUN REWARD RATE (YEAR)
TANEED	68.6	C	TIME TO AVERAGE NEEDS (YEARS)
TASRR			TIME TO AVERAGE SHORT-RUN REWARD RATE (YEARS)
TCERW	69.1	C	TIME TO COMMUNICATE EXPECTED REWARD (YEARS)
TCSAF	69.2	C	TIME TO ADJUST SELF-ACTUALIZATION (YEARS)
TDISSA	68.8	C	TOLERABLE DISSATISFACTION (DISSATISFACTION UNITS)
TDPEND	25.1	T	TABLE FOR THE DEPENDENCY FACTOR (DIMENSIONLESS)
TEDSMD	34.1	T	TABLE FOR THE EFFECT OF DISSATISFACTION ON SELF-MOTIVATED DESIRES (DIMENSIONLESS)
TEFR	65.1	T	TABLE FOR THE EFFECTIVENESS OF THE REWARD (DIMENSIONLESS)
TENRSA	49.1	T	TABLE FOR THE EFFECT OF NEED RATIO ON SELF- ACTUALIZATION (DIMENSIONLESS)
TEPEMA	5.1	T	TABLE FOR THE EFFECT OF PAST EXTERNALLY- MOTIVATED ACTIVITIES (DIMENSIONLESS)

TEPRLS	8.1	T	TABLE FOR THE EFFECT OF PARALYSIS (DIMENSIONLESS)
TEPSMA	19.1	T	TABLE FOR THE EFFECT OF PAST SELF- MOTIVATED ACTIVITIES (DIMENSIONLESS)
TESA	33.1	T	TABLE FOR THE EFFECT OF SELF-ACTUALIZATION ON SELF-MOTIVATED ACCOMPLISHMENT (DIMENSIONLESS)
TESAFE	31.1	T	TABLE FOR THE EFFECT OF SELF-ACTUALIZATION ON EXPECTATIONS (DIMENSIONLESS)
TESANT	55.1	T	TABLE FOR THE EFFECT OF SELF-ACTUALIZATION ON NEED TOLERANCE (DIMENSIONLESS)
TESMA	50.1	T	TABLE FOR THE EFFECT OF SELF-MOTIVATED ACCOMPLISHMENT ON SELF-ACTUALIZATION (DIMENSIONLESS)
TFAC	11.1	T	TABLE FOR FRACTIONAL ADDITIONS TO COMMITMENTS (DIMENSIONLESS)
TFCDAD	39.1	T	TABLE FOR FRACTIONAL CHANGE DUE TO ACCOMPLISHMENT DISPARITY (DIMENSIONLESS)
TFCDN	45.1	T	TABLE FOR FRACTIONAL CHANGE IN DISSATISFACTION DUE TO UNSATISFIED BASIC NEEDS (DIMENSIONLESS)
TFCDRT	41.1	T	TABLE FOR FRACTIONAL CHANGE IN DISSATISFACTION DUE TO RECENT TRENDS IN RECEIVING REWARDS (DIMENSIONLESS)
TFWC	14.1	T	TABLE FOR FRACTIONAL WITHDRAWAL OF COMMITMENTS (DIMENSIONLESS)
TLABR	27.1	T	TABLE FOR THE LIKELIHOOD OF ANY ACCOMPLISHMENT BEING REWARDED (DIMENSIONLESS)
TMAN	58.1	T	TABLE FOR THE MULTIPLIER FROM THE AVAILABILITY OF NEEDS TO SATISFY (DIMENSIONLESS)
TMVR	26.1	T	TABLE FOR THE VALUE OF REWARD (DIMENSIONLESS)
TPEA	68.9	C	TIME TO PERCEIVE EXPECTED ACCOMPLISHMENT (YEARS)
TSANRR	60.1	T	TABLE FOR THE EFFECT OF SELF-ACTUALIZATION ON NEED RECOGNITION (DIMENSIONLESS)
WCOMIT	13	R	WITHDRAWAL OF COMMITMENTS FROM EXTERNALLY MOTIVATED ACTIVITIES (ACCOMPLISHMENT UNITS/YEAR/YEAR)
WN	69.3	C	WEIGHING FACTOR (DIMENSIONLESS)

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